Metals Review
THE NEWS DIGEST MAGAZINE
Volume XXIII - No. 12 December, 1950

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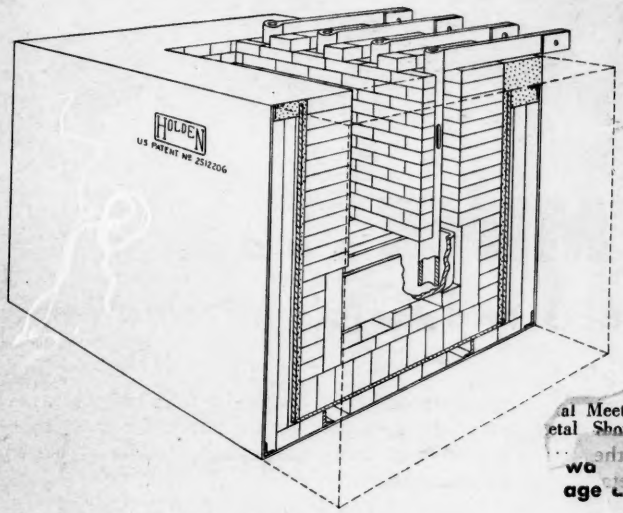

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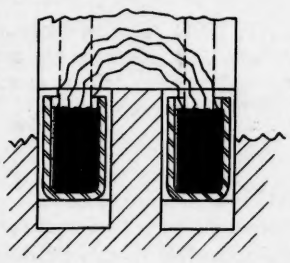

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Metals Review

THE NEWS DIGEST MAGAZINE

VOLUME XXIII, No. 12 DECEMBER, 1950

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Reports of the President, Secretary and Treasurer; Election of Officers

THE ANNUAL MEETING of the American Society for Metals was held in Chicago on Wednesday morning, Oct. 25, during the National Metal Congress and Exposition.

President Focke presented the slate of new officers nominated last May (see *Metals Review*, June 1950). No additional nominations having been received, the secretary cast the unanimous vote of the members for these candidates.

Annual reports of the president, treasurer and secretary were presented, and are reproduced in summary below. They will be published in full in the next volume of the A.S.M. *Transactions*.

PRESIDENT'S REPORT

Presented by Arthur E. Focke
Chief Metallurgist
Diamond Chain Co., Inc.
Retiring A. S. M. President

. . . It is my pleasant duty to report to you that under the watchful, vigorous and ingenious care of our Executive Secretary, our Society continues to move forward successfully. You will hear the details of these successes in the reports of your secretary and of your treasurer.

For his part . . .. your president traveled 30,000 miles during the past year to visit 44 chapters, 4 regional meetings, 4 meetings of the Board of Trustees, 6 meetings of standing or special committees and to represent our Society at three other special events. . . .

We know that our local chapters are the backbone of our Society. Have you ever stopped to realize how much our individual members and their companies contribute when making our local chapter meetings possible and effective by presenting their technical talks? If we ignore the time spent in preparation and assume that each speaker spends four days on each talk—one traveling to the meeting, one there, one returning home and one getting over it—with our 79 chapters each holding about 7 technical meetings each year, you can begin to see that at the rate of over 2000 man-days it is truly a very sizable contribution . .. .

Your president in his talks to the chapters this year experimented with an unorthodox type of presentation. It included audience participation, repetition, and association . . . .It was not original. The oral repetition part, at least, was an old teaching device when John Adams went to school to Mr. Cleverly. Since it was an experiment, an effort was made to measure the results by arranging for each member of the audience to indicate his preference and his job classification. There is some question that the results are truly representative . . . So, for what it may be worth:

(*a*) Of those attending the 37 chapter meetings on which this technique was tried, 82% stated that they preferred the unorthodox presentation.

(*b*) The highest vote in favor of the presentation at any chapter was 98% and the lowest was 66%.

(*c*) There was evidence that this type of talk was more acceptable to the smaller chapters (fewer than 150 members) than to the larger (over 500 members). . . .

(*d*) It was interesting that, while your president expected that his unconventional presentation would be accepted better by the practical man than by the technical, two of the highest scores were made in chapters that one would consider well above the average in technical competency . . .

It is certainly not your president's intention to suggest that his unconventional presentation be generally adopted. He is not sure he liked it himself. But these results should tend to encourage every chapter speaker to consider whether or not there are new or different techniques that would help to make his talk more useful to our members.

From the summary of the job classification on these votes, while the make-up of the attendance at these chapters varied widely, the average showed that 49% had technical activities as their primary interest, 32% were concerned with problems of production supervision, and 14% were in sales.

It seems important to note that these average figures for chapter attendance correspond closely to the Audit Bureau of Circulation Reports for Metal Progress. Referred to the same basis, these show about 45% technical, 42% production supervision, and 11% sales. This would appear to confirm our general feeling that our chapter and national activities are well coordinated.

One new chapter was added during the past year. It was your president's pleasant duty to present the charter to the Northern Ontario Chapter at Sault Ste. Marie on April 27, 1950. In addition, student groups were organized with the New York Chapter at the Brooklyn Polytechnic Institute and with the West Michigan Chapter at Michigan State College.

On the national basis, your Board of Trustees held four meetings—on Oct. 21, 1949 and May 17, Aug. 24 and Oct. 24, 1950. At these meetings, in addition to concerning themselves closely with the problems of finances, the members of the Board have given serious attention to several important phases of A.S.M. activities. These have all been concerned with considering methods whereby the A.S.M. may be more useful to its members and how our Society can help to raise still farther the status of the metallurgical profession. At this time, special mention should be made of the faithful services of the retiring members of the Board of Trustees—Harry Croft and Fred Robbins . . .

Early this year, it was suggested that our Society, through the facilities and with the assistance of the Economic Cooperation Administration, expand this National Metal Congress into a World Metallurgical Congress, at which several hundred top scientists in the metals field from all over the world would participate. Bill Eisenman prepared a fine outline of the possibilities of this Congress. This was accepted with enthusiasm by the ECA, and your president, your secretary and several other members of your national office spent many hours working with their representatives in an effort to make this event possible for this year. But we finally had to admit that the time was just too short to do the job properly and it was necessary to postpone this event until next year.

It is customary for your president to record in his report the outstanding events of the previous Congress. In Cleveland, in 1949, the President's Medal was awarded to Francis B. Foley. The Howe Award was given to B. L. Averbach, Morris Cohen, and S. D. Fletcher. The 1949 Campbell Lecture was presented by Edgar H. Dix, Jr., of the Aluminum Co. of America, and the Sauveur

Achievement Award was granted to Marcus A. Grossmann, director of research, Carnegie-Illinois Steel Corp. The Gold Medal was presented to Edgar C. Bain, vice-president in charge of research and technology, Carnegie-Illinois Steel Corp., and the A.S.M. Medal for the Advancement of Research was given to Fred H. Haggerson, president of the Union Carbide and Carbon Corp.

In conclusion, I wish to extend, on behalf of the Board of Trustees, our appreciation for the splendid support and cooperation of the participating societies—the American Institute of Mining & Metallurgical Engineers, American Welding Society, and the Society for Non-Destructive Testing. They have prepared attractive programs and contributed greatly to the success of this Congress.

Finally, your president wishes to express his thanks to all the members of the national office, the Board of Trustees, the chairmen and members of national committees and those of the local chapters, and to all of you who have contributed so much of your time and effort to the success of our Society.

SECRETARY'S REPORT

Presented by W. H. Eisenman

Secretary, American Society for Metals

The American Society for Metals on Oct. 1, 1950 had a total membership of 20,016. Of this number 16,802 or 83.9% were the member classification, 1706 or 8.5% were sustaining members while 1464 or 7.3% were junior members. There were 42 honorary and founder members.

Transactions—Since the last National Metal Congress, Vol. 42 and Vol. 42A of the *Transactions* were published and distributed to the membership in April 1950. Vol. 42 totals 1356 pages and constitutes 51 articles with their discussions. It contains all of the papers presented at the October 1949 Convention held in Cleveland, together with papers presented at the Western Metal Congress held in Los Angeles in April 1949, and interim papers received during the year. . . .

Vol. 42A contains the 14 papers (319 pages) presented at the seminar on "Thermodynamics in Physical Metallurgy" held on Saturday and Sunday, Oct. 15 and 16, 1949, during the National Metal Congress and Exposition, Cleveland. This seminar was sponsored by the American Society for Metals, the subject being selected by a committee appointed by the Board of Trustees. . . .

Publications Committee — Seventeen persons constitute the membership of the Publications Committee for 1950, under the chairmanship of A. R. Troiano. . . . During the year the Committee has reviewed 76 papers. Of this number 45 were approved for presentation at this Convention and publication in *Transactions*. . . . 5 papers were approved for *Transactions* as interim papers; 4 were recommended for publication in *Metal Progress;* 22 were not approved for printing in A.S.M. publications. . . .

The Publications Committee held one formal meeting on June 14 and 15, 1950. . . .

Metal Progress—Data on total editorial pages since the 1946 peak are: 1946, 832 pages; 1947, 722; 1948, 628; 1949, 621; 1950, 622.

The editorial resources of *Metal Progress* were improved by the appointment of Adolph Bregman and Harold J. Roast, experts respectively in the fields of cleaning and finishing, and of nonferrous foundry work. . . . Much attention has also been given to modern methods of heat treatment, alloys for ultra high temperature service, and the once-rare metals now available in commercial quantities. . .

During the year the Society has donated considerable of Ernest E. Thum's time to the U. S. Atomic Energy Commission as chairman of the "Working Committee on Technological Information for Industry". . . .

Metals Review continues to serve as the monthly news digest magazine of the Society, reporting local chapter meetings, activities of members, and news from headquarters. Of the total of 632 pages published during the 12 months from Oct. 1949 through Sept. 1950, 194 pages or 31% were devoted to material of this nature. . . . Altogether, 307 reports of chapter meetings were contributed and printed.

The bulk of the remaining pages was devoted to the A.S.M. Review of Metal Literature, which covered 362 printed pages, or 57% of the total. In February 1950 a new classification system was adopted for the Review of Metal Literature, developed after two years of work by a joint committee of the American Society for Metals and the Special Libraries Association. . . .

An offshoot of this project was the publication of the ASM-SLA Metallurgical Literature Classification, and also the development of a standardized punched card system for literature indexing and filing, which is available to A.S.M. members and to librarians at manufacturer's cost.

Metals Handbook continues to make a name for itself with all new members, and is doing yeoman service in the hands of 27,162 individuals. The Metals Handbook Committee is inactive during the lull following the publication of the last edition and will remain so for two years, when plans will begin to mature for the new edition.

The Educational Committee for the year 1950 . . . (J. F. Kahles, chairman) . . . held one formal meeting on Jan. 17, 1950, at which time the three educational lecture courses for the 1950 Convention were selected and planned. These lectures are: "High Temperature Properties of Metals" by 6 authors; "Interpretation of Tests and Correlation with Service" by 6 authors; and "Metallurgy of Titanium" by 3 authors.

In addition, plans were laid for the making of a third motion picture film entitled "The Heat Treatment of Steel". The tentative scenario was prepared by Prof. J. O. Lord and carefully reviewed by members of the committee and others. At the present time about half of the photography has been completed and it is hoped that the entire film will be available by Jan. 1, 1951. . . .

Books—During the past year, a total of 18,125 books published by the Society were sold to members and others. This figure includes 1,681 copies of the 1948 Metals Handbook.

During this period eight titles were added to the publication list. These are:

Transactions of the A.S.M., Vol. 42; Review of Metal Literature, Vol. 6; ASM-SLA Metallurgical Literature Classification and Work Sheets; Casting of Brass & Bronze, by D. R. Hull; Machining—Theory and Practice, by 15 authors; Thermodynamics in Physical Metallurgy, seminar by 14 authors; Mechanical Wear, by 22 authors; Crystallography of the Elements, by W. B. F. Mackay and H. S. Jerabek—(A series of pamphlets for the student, researcher or engineer on Metallurgical Data—No. 1)

The following titles are now in preparation:

The Story of Metals, Techbook by John W. W. Sullivan; The Nature of Metals, Techbook by B. A. Rogers; Atmosphere Heat Treatment of Steel, by Floyd E. Harris; High-Temperature Properties of Metals, by 6 authors; Interpretation of Tests and Correlation With Service, by 6 authors; Metallurgy of Titanium, by 3 authors.

The Advisory Committee on Metallurgical Education, under the chairmanship of W. W. Sullivan, worked on a number of projects during the past year. Among them were:

1. Teaching award.
2. Securing information through local chapters re vocational schools.
3. Formation of counselors for high school students by chapters.
4. A progress report on laboratory manual on process metallurgy.
5. A continuation of the analysis of replies to the occupational questionnaire sent out last year.
6. Consideration of an A.S.M. visiting lectureship.

Some of them have already been placed in effect and others are being given serious consideration by the Board.

Preprints—Of the 45 papers being presented at this convention, 42 were prepared in preprint form and distributed to those members of the

Society who requested them. The total number of pages for the 1950 preprints is 846. A total of 45,000 preprint copies were distributed free to the membership.

The Seminar on Atom Movements (Clarence Zener, chairman of the committee on arrangements) this year was an outstanding success. It was divided into four important and interesting sessions with the meeting room filled to capacity. This interest is a great compliment to the committee and the seminar speakers and assures a continuance of this important annual event.

Metal Congress—The 32nd National Metal Congress enters on its third day. Those of you who are in attendance are well able to judge the fine success this activity will be.

There have been two added features this year—the sales clinic held Sunday evening, and the business forum to be held Thursday morning. . . .

High Production Meetings from management's viewpoint are being held on Monday, Tuesday, Wednesday, and Thursday afternoons at the Saddle & Sirloin Club at the Stockyards. These sessions are being devoted to increasing output. . . .

The Chicago Exposition has lived up to all expectations. It is having a magnificent attendance and proving to be a great success.

Following the usual practice, approximately 400 exhibitors reserved space, and it is estimated the attendance will be approximately 50,000 with registration 35,000.

The Western Metal Congress and Exposition will be held in Oakland, March 19-23, 1951. Floor plans have already been distributed and we have received many reservations.

1951 Exposition—Since last July the national headquarters has worked diligently on the 33rd National Metal Congress and Exposition which will be held in Detroit the week of Oct. 15, 1951.

The Exposition will be located in the buildings at the State Fair Grounds. Since the National Metal Congress and Exposition have not been in Detroit for 13 years, due to our inability to secure adequate exposition facilities, we contemplate that this exposition will be the largest ever held by the Society. . . .

World Metallurgical Congress—As the president mentioned in his report, plans were initiated to hold in this country a World Metallurgical Congress simultaneously with this convention and exposition. However, the amount of time involved as far as communications were concerned, brought the acceptance too late in order to complete satisfactory plans for this event.

Therefore, it was wisely decided by the Board that the World Metallurgical Congress should be postponed until the Metal Congress in Detroit next year.

In November, this year, invitations will go to all the free countries of the world inviting them to send groups of at least 20 members on the top scientific level to discuss world metallurgical practices according to the ten divisions of the Congress.

The A.S.M. has had a wonderful year, as you have been able to judge from the reports of the President, the Treasurer, and the Secretary.

Speaking for the national office staff I can assure you it has been a pleasure to serve you, and in the same breath may I add that our continued endeavor will be to perfect the present services for the members and to strive constantly to increase the services.

Chicago Chapter in the Metal Show

A View in the Chicago Chapter's Booth at the Recent Metal Show. Two visitors at the counter are getting A. S. M. information from Ed F. Roff. In the background, from left, are "Andy" Engelhardt, John W. Queen, "Dick" F. Pinter, a receptionist, and "Billy" (W. E.) Williams. The booth was staffed at all times by at least two members and a receptionist, who handled telephone calls and took messages. A. S. M. literature and membership blanks were available, and numerous inquiries about the Society were answered. (Reported by T. F. Sullivan)

TREASURER'S REPORT

Presented by Ralph L. Wilson
Chief Metallurgical Engineer
Timken Steel & Tube Div.

It is a pleasure to report that your Society has completed another prosperous year. . . .

Total assets have shown an increase of $121,885.80. Cash has gained $30,447.98 and holdings of securities have been increased $67,963.66. During the year there were a number of changes in the investment portfolio. Several bonds were called for redemption. All the industrial bonds and a few common stocks were sold, while government bonds and different common stocks were acquired. The net effect of these transactions was to increase moderately the proportion of common stocks in the portfolio, with the expectation of improving the yield on the Society's investments. In planning and executing investment programs of this nature, the Society follows the recommendations of the Cleveland Trust Co. as Agent, with whom the Finance Committee and the Board of Trustees have regular meetings to review the status of the A.S.M. portfolio.

The market value of the Society's investments on Aug. 31, 1950 was approximately $1,570,031.02, with the stocks accounting for about 33% of the total. Dividends and interest earned came to $56,852.52 or 3.92% based on the carrying value as compared to a corresponding figure of 3.65% for last year.

Total income and expense for the year ending Aug. 31, 1950 were:

Income	$934,918.93
Expense	793,488.60
Net Income	$141,430.33

Dues paid by members were the largest source of net income to the Society. Gross income from dues amounted to $216,156.14, of which $88,733.35 was returned to the chap-

ters. However, it has long been known that the members of A.S.M. received from the Society services that exceed the cost of the membership. In the fiscal year just ended the Society spent about $44 per member.

The Metal Expositions continue to make substantial contributions to net income. *Metal Progress* showed a smaller excess of income over expense this year than last. Publishing and sales of books, including Metals Handbook and Literature Review, provided a net income of $26,732. Interest and dividends are growing in amount and are becoming an increasingly important part of the income of the Society. *Transactions* and *Metals Review*, which are not self-sustaining, were distributed at a net cost to the Society of $30,293 and $25,804, respectively.

The Metals Handbook reserve, being accumulated to take care of the publication of the next revision, received an addition of $18,895, bringing the total to $67,139.50.

Since the local chapters must have money to promote the aims of the Society effectively, it is reassuring to know that the combined assets of the Chapters are about $205,000, an increase of nearly $5,000 in the year....

Western Metal Show Committees Named; "Production for America" Is Theme

More than 200 metal firms will show their new products and latest developments at the Seventh Western Metal Exposition to be held for five days—March 19 through 23, 1951—in Oakland's vast Auditorium and Exposition Hall.

On the same dates, approximately 100 authoritative speakers will deliver papers on recent developments in making, working, fabricating, treating and application of metals. These speakers will be heard at technical sessions of the Western Metal Congress, also to be held in Oakland concurrently with the Exposition. Both the show and the congress will be sponsored, as in the past, by the American Society for Metals in cooperation with 20 other national technical societies. William H. Eisenman, A.S.M. national secretary, is director of the combined event.

In keeping with increased demands imposed on the metal industry, the theme for exhibits and speakers will be "Production for America". Displays and papers will be based on application of metals in the oil, chemical, manufacturing, aviation, construction, mining and other industries.

Considerably more than 50% of the exhibit space already has been assigned to western, midwestern and eastern producers. Many national concerns which produce metals, machinery and testing equipment have reserved display areas.

A local committee, headed by Harry E. Lewis of Pyromet Brazing and Heat Treating Co., chairman of Golden Gate Chapter, A.S.M. has held several meetings to pave the way in the western states for the show and congress. Harry E. Krayenbuhl, Oliver United Filters, Inc., is general secretary. Vice-chairmen are Bertram W. Depew, General Electric Co.; Philip McCaffery, General Metals Corp.; and E. A. Daniels, Victor Equipment Co. The latter is special representative of the American Welding Society on the committee.

Special chairmanships are as follows:

Attendance: Guy M. Winton, Allegheny Ludlum Steel Co.; Cooperating Societies: George A. Nelson, Shell Development Co.; Entertainment: Paul C. Childs, Earle M. Jorgensen Co.; Exhibits: G. B. Berlien, Industrial Steel Treating Co. Housing: Charles A. Blesch, Natural Gas Equipment Co.; Information and Registration: Thomas S. Hutton, Thomas S. Hutton & Son; Plant Inspection: Fred I. Donlevy, Caterpillar Tractor Co.; Program: Earl R. Parker, University of California; Publicity: W. A. Fletcher, E. F. Houghton & Co.

Preparations are made for a large attendance. The exposition—the seventh to be held on the West Coast—again will enable plant operators, industrial executives, engineers, production men and purchasing agents to study the progress made in metal products and metal handling throughout the United States. Technical advances achieved in the same period will be discussed with clear precision at sessions of the congress.

Societies cooperating with ASM in presenting the exposition and congress include:

American Chemical Society
American Foundrymen's Society
American Institute of Chemical Engineers
American Institute of Electrical Engineers
American Institute of Mining and Metallurgical Engineers
American Society of Civil Engineers
American Society of Mechanical Engineers
American Society for Testing Materials
American Society of Tool Engineers
American Welding Society
Institute of Aeronautical Sciences
Mining Association of California
National Association of Corrosion Engineers
National Association of Lubricating Engineers
Pacific Coast Electrical Association

(*Continued in next column*)

Pacific Coast Gas Association
Purchasing Agents' Association of Northern California, Inc.
Society of Automotive Engineers
Society for Non-Destructive Testing
Western Oil and Gas Association.

Special Placement Service Offered To Met. Graduates

A plan for expansion of A.S.M. services to its junior members has recently beeen adopted following a study made by a Student Affairs Committee appointed by the Board of Trustees of the American Society for Metals.

This committee has plans underway for instituting student chapters of the Society in those schools and colleges which have a large number of junior members. These student chapters will be provided with material from national headquarters to help them in arranging stimulating meetings and programs during the school year.

As a further service to the junior members, the Society is extending its placement service so as to publicize the qualifications of all graduating seniors and candidates for advanced degrees who will be available to industry between now and next June. While the regular Employment Service Bureau is, of course, open to junior members as well as to regular members of the Society, the new arrangement will bring these graduates more forcibly to the attention of industry.

In accordance with this plan, all graduating students who are members of the American Society for Metals are invited to submit a resume of their qualifications, together with a photograph, which will be published at no cost to the student, in the February issue of *Metals Review*. The names of the graduates will be listed under the name of the school they are attending, and replies can be sent either direct to the student or to the head of the department at the school or college.

In addition to bringing these candidates to the attention of the 22,000 members of the A.S.M. in this manner, a reprint of this section will be mailed to the personnel departments of some 5000 large industrial metalworking plants.

Special forms are available for listing the information to be published in *Metals Review*. They may be secured by addressing an inquiry to the Junior Members' Placement Service, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. For publication in the February issue, the completed forms must be returned to national headquarters not later than Jan. 1, 1951.

Sustaining Members Sponsor Chapter Meetings

Cincinnati Chapter Has Inaugurated a Plan This Season in Which Each Meeting Is Sponsored by a Different Sustaining Member. The sponsor company is also provided an opportunity to exhibit his products. A sustaining member is chosen who is associated with the evening's speaker. A sustaining company representative not only presents the speaker, but he and his staff discuss the exhibit after the formal closure of the meeting. As shown in the photographs above, the September meeting featured Armco Steel Corp. and the November meeting was conducted by the Metcut Research Associates

(Reported by Marvin L. Steinbuch, Lunkenheimer Co.)

Million-Ton Steel Mill Contemplated for Ingot Production in New England

Reported by Lester F. Spencer
Landers, Frary & Clark

A survey of the potential market for products of a 1,000,000-ton steel mill for Connecticut will be completed in about six weeks by engineers of the New England Council's Steel Development Corp., Clifford S. Strike, head of the group, said on Oct. 10. Mr. Strike spoke before the Hartford Chapter A.S.M.

As visualized at this time, a steel mill of 1,000,000 tons annual capacity will cost approximately $300,000,000, he added. If none of the operating steel companies is interested in the construction and operation of such a plant, the work will be privately undertaken. The New England Steel Development Corp. (owned by the New England Council) will then consider the financing problems, he said.

In a question period, Mr. Strike said that there has already been discussion with the RFC for financial support for a steel mill here. This would be about 75% of the capital cost, or more than $200,000,000. The contemplated steel mill for Connecticut would be a so-called integrated plant for ingot production, and would not be competitive in the special steel markets.

Questioned about the possibility of pig iron production at the mill, Mr. Strike said that it would probably not be undertaken. As to availability of coal supplies, a coal company is ready to supply 50% of the coal requirements at a price about the same as that for coal delivered at Chicago and 50 cents a ton more than at Pittsburgh.

Those looking to the establishment of a steel mill in Connecticut are opposed to its becoming a springboard for nationalization of the steel industry, Mr. Strike said. He added that his group has no intention of departing from the principle of private ownership.

Under the pressure of war conditions, the steel plant could be completed in two years, or three years, under good economic conditions. Labrador ore supplies will not be available until 1955 or 1957, said Mr. Strike. If the Connecticut mill is built in the meantime, ore will be sought elsewhere.

Technical Papers Invited

The Publications Committee of the A.S.M. will now receive technical papers for consideration for publication in the 1952 *Transactions*. A cordial invitation is extended to all members and nonmembers of the A.S.M. to submit technical papers to the society. Many of the papers approved by the committee will be scheduled for presentation on the technical program of the 33rd National Metal Congress and Exposition to be held in Detroit, Oct. 15 to 19, 1951. Papers that are selected for presentation at the Convention will be preprinted and manuscripts should be received at A.S.M. headquarters office not later than April 10, 1951.

Manuscripts in triplicate, plus one set of unmounted photographs and original tracings, should be sent to the attention of Ray T. Bayless, assistant secretary, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

Headquarters should be notified of your intention to submit a paper, and helpful suggestions for the preparation of technical papers will be sent.

Named as Assistant on Staff of Metal Shows

A recent addition to the headquarters staff of the American Society for Metals is Mulford L. Cass, who has been appointed to the executive staff of the National Metal Exposition and Western Metal Exposition. Mr. Cass, who has served as assistant to Chester L. Wells at the 1948, 1949 and 1950 Metals Shows, continues in that capacity and will now devote his entire time to Metal Show planning and operation. Mr. Wells is assistant director of both the national and western shows, and W. H. Eisenman, national secretary of the American Society for Metals, is managing director of the expositions.

M. L. Cass

Mr. Cass is well known in Cleveland convention circles through his work with many national expositions held at Cleveland Public Auditorium.

Appointments to A.S.M. Standing Committees

M. A. Hunter
Advisory Education

J. H. Hollomon
Seminar

W. J. DeMauriac
Constitution

W. A. Pennington
Publications

K. L. Fetters
Educational

COMMITTEE CHAIRMEN APPOINTED BY AMERICAN SOCIETY FOR METALS

At the meeting of the Board of Trustees of the American Society for Metals held Oct. 27, new appointments to the various national committees of the Society were announced by President Jominy and confirmed by the Board. The complete personnel of the standing committees is listed below. The new appointments are shown in italics and the numerals represent the date of expiration.

Metal Progress Advisory Committee

E. E. Thum, Editor, Metal Progress, Cleveland.
Walter Jominy, President, A.S.M.
John Chipman, Vice-President, A.S.M.
W. H. Eisenman, Secretary, A.S.M.
Ray T. Bayless, Assistant Secretary, A.S.M.
Albert W. Demmler, Campbell, Wyant and Cannon Foundry Co., Muskegon, Mich., '52.
Muir L. Frey, Allis-Chalmers Mfg. Co., Milwaukee, '52.
J. D. Hanawalt, Dow Chemical Co., Midland, Mich., '51.
L. A. Lindberg, Lindberg Steel Treating Co., Chicago, '51.
Frank G. Norris, Wheeling Steel Corp., Pittsburgh, '53.
Howard Scott, Westinghouse Electric Co., East Pittsburgh, Pa., '51.

Advisory Committee on Metallurgical Education

M. A. Hunter, Rensselaer Polytechnic Institute, Troy, N. Y., Chairman, '50.
Alfred Bornemann, Stevens Institute of Technology, Hoboken, N. J., '51.
John Chipman, Massachusetts Institute of Technology, Cambridge, Mass., '51. (Representative of Board of Trustees)
D. S. Eppelsheimer, Missouri School of Mines, Rolla, Mo. '53.
James Gregg, Cornell University, Ithaca, N. Y., '51.
F. M. Klayer, Tube Turns Inc., Louisville, Ky., '52.
V. N. Krivobok, International Nickel Co., New York City, '52.
C. K. Lockwood, Shawinigan Chemicals Ltd., Montreal, Quebec, '52.
W. O. Philbrook, Carnegie Institute of Technology, Pittsburgh, '52.
John W. W. Sullivan, American Iron and Steel Institute, New York City, '51.
E. C. Wright, University of Alabama, University, Ala., '53.

Publications Committee

W. A. Pennington, Carrier Corp., Syracuse, N. Y. Chairman, '51.
Ray T. Bayless, A.S.M., secretary.
W. M. Baldwin, Jr., Case Institute of Technology, Cleveland, '51.
W. E. Bancroft, Pratt & Whitney Div., Niles-Bement-Pond Co., W. Hartford, Conn., '53.
J. A. Bennett, National Bureau of Standards, Washington, D. C., '52.
Edgar Brooker, United States Spring & Bumper Co., Los Angeles, '51.
C. L. Clark, Timken Roller Bearing Co., Canton, Ohio, '53.
C. K. Donoho, American Cast Iron Pipe Co., Birmingham, Ala., '51.
A. J. Herzig, Climax Molybdenum Co., Detroit, '51.
E. I. Larsen, P. R. Mallory & Co., Inc., Indianapolis, '52.
W. E. Mahin, Armour Research Foundation, Chicago, '51.
E. M. Mahla, E. I. du Pont de Nemours Co., Wilmington, Del., '53.
F. T. McGuire, Deere & Co., Moline, Ill., '53.
M. E. Merchant, Cincinnati Milling Machine Co., Cincinnati, '53.
G. C. Riegel, Caterpillar Tractor Co., Peoria, Ill., '52.
George A. Roberts, Vanadium-Alloys Steel Co., Latrobe, Pa., '52.
C. H. Samans, Standard Oil Co., Chicago, '53.
L. P. Tarasov, Norton Co., Worcester, Mass., '52.

Seminar Committee

J. H. Hollomon, General Electric Co., Schenectady, Chairman, '51.
J. B. Austin, U. S. Steel Corp., Kearny, N. J., '51. (Representative of the Board of Trustees)
R. M. Brick, University of Pennsylvania, Philadelphia, '51.
Morris Cohen, Massachusetts Institute of Technology, Cambridge, Mass., '51.
M. Gensamer, Columbia University, New York, '51.
L. R. Jackson, Battelle Memorial Institute, Columbus, Ohio, '51.
L. K. Jetter, Oak Ridge National Laboratory, Oak Ridge, Tenn., '51.
Don McCutcheon, Ford Motor Co., Dearborn, Mich., '51.
Oscar Marske, Naval Research Laboratory, Washington, D. C., '51.
Earl R. Parker, University of California, Berkeley, Calif., '51.
Clarence Zener, Institute for the Study of Metals, University of Chicago, '51.

Metals Handbook Committee*

J. B. Johnson, Wright-Patterson Air Force Base, Dayton, Ohio, Chairman, '51.
Taylor Lyman, A.S.M., secretary.
Howard S. Avery, American Brake Shoe Co., Mahwah, N. J., '51.
R. M. Brick, University of Pennsylvania, Philadelphia, '51.
Walter Crafts, Union Carbide & Carbon Research Laboratories, Niagara Falls, N. Y., '52.
E. S. Davenport, U. S. Steel Corp., Pittsburgh, '51.
E. O. Dixon, Ladish Drop Forge Co., Cudahy, Wis., '51.
B. W. Gonser, Battelle Memorial Institute, Columbus, Ohio, '51.
Max Hansen, Illinois Institute of Technology, Chicago, '51.
R. L. Kenyon, Armco Steel Corp., Middletown, Ohio, '51.
Paul Moss, Eaton Manufacturing Co., Saginaw, Mich., '53.
Peter Payson, Crucible Steel Co. of America, Harrison, N. J., '51.
Robert L. Sweet, Michigan State College, East Lansing, Mich., '53.
R. E. VanDeventer, Packard Motor Car Co., Detroit, '52.

* Inasmuch as the Handbook Committee is at present inactive, President Jominy recommended and the Board of Trustees concurred, that the present committee be re-appointed for another year and that the two names shown in italics be added.

Educational Committee

K. L. Fetters, Youngstown Sheet & Tube Co., Youngstown, Ohio, Chairman, '51.
Ray T. Bayless, A.S.M., secretary.
M. J. Day, Carnegie-Illinois Steel Corp., Pittsburgh, '52.
N. J. Grant, Massachusetts Institute of Technology, Cambridge, Mass., '51.
H. Y. Hunsicker, Aluminum Co. of America, Cleveland, '52.
I. R. Kramer, Office of Naval Research, Washington, D. C., '52.
C. L. Lewis, Cook Heat Treating Co., Houston, Texas, '51.
Ray McBrian, Denver and Rio Grande Western Railroad Co., '52.
F. G. Tatnall, Baldwin Locomotive Works, Eddystone, Pa., '53.
R. F. Thomson, General Motors Corp., Detroit, '53.

Constitution and By-Laws Committee

W. J. DeMauriac, Philadelphia Electric Co., Philadelphia, Chairman, '51.
H. E. Flanders, University of Utah, Salt Lake City, Utah, '53.
F. A. Forward, University of British Columbia, Vancouver, B. C., '51.
Elmer Gammeter, representative of the Board of Trustees.
E. J. Hergenroether, International Nickel Co., Detroit, '52.
Gilbert Schaller, University of Washington, Seattle, Wash., '52.
Lloyd G. Tone, General Electric Co., Erie, Pa., '53.

Finance Committee

Ralph Wilson, Timken Roller Bearing Co., Canton, Ohio, Chairman (A.S.M. Treasurer).
A. A. Hess, A.S.M., assistant treasurer, '53.
Zay Jeffries, Case Institute of Technology, Cleveland, '51.
R. Lynch, Atlantic Steel Co., Atlanta, Ga., '52.
R. B. Schenck, Buick Motor Div., General Motors Corp., Flint, Mich., '53.
K. R. Van Horn, Aluminum Co. of America, New Kensington, Pa., '52.
L. C. Whitney, Copperweld Steel Co., Glassport, Pa., '51.
H. F. Wood, Wyman Gordon Co., Harvey, Ill., '53.

Back Issues Needed

Extra copies of *Metal Progress* for January, June or October 1950, and of *Metals Review* for June 1950 are badly needed at A.S.M. national headquarters. If you have any or all of these issues, it would be highly appreciated if you would return them to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio, addressed to the attention of Chester L. Wells.

New Coated Molybdenum Described

L. F. Yntema (Center) of Fansteel Metallurgical Corp., Described a Promising Siliconized Coating for Molybdenum in a Talk on Refractory Metals at Mahoning Valley. Left is Eugene Smith of Youngstown Sheet & Tube Co., technical chairman of the meeting; and at right H. H. Johnson of National Malleable & Steel Castings Co., chapter chairman

Reported by J. G. Cutton
Metallurgist, Carnegie-Illinois Steel Corp.

Speaking on "The Metallurgy and Application of Refractory Metals," Leonard F. Yntema reviewed the production of such metals as tungsten, molybdenum, tantalum and columbium. Dr. Yntema, who is director of research for Fansteel Metallurgical Corp., addressed the Mahoning Valley Chapter's meeting of Oct. 10.

Processing of these metals follows the same general procedure; the ore is converted to a salt, the salt is reduced to metallic powder, and the powder pressed and sintered in the pure metal form.

Most of Dr. Yntema's lecture was concerned with applications of these refractory metals. Tungsten is used principally in electronics, such as filaments and X-ray targets, welding electrodes and heating elements. Pure molybdenum is fabricated into sheets, bars and wire for uses similar to those of tungsten.

Tantalum is used in rectifiers primarily because the oxide is stable and becomes an insulator. This metal is also used in hydrochloric acid condensers because it has absolute resistance to corrosion by this acid up to concentrations of 70%. Some electrical parts such as grids are made of tantalum. Use of tantalum in surgery for plates and suture wires is also of current interest.

The highlight of Dr. Yntema's talk was the exclusive process developed by Fansteel for the production of a siliconized coating on pure molybdenum. This coating will protect the pure metal from oxidation at high temperatures; long life up to 3000° F. under either oxidizing or reducing atmosphere was indicated. This material has been recommended for heating elements, jets and nozzles, spark gaps, gas turbine engine parts and crucibles. The future of this material seems very promising in high-temperature applications.

Economics of Steelmaking Presented by Clark

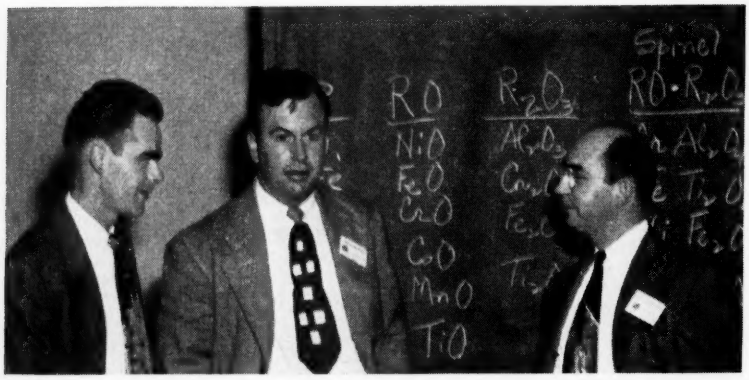
Reported by D. C. Goldberg
Hamilton Watch Co.

The development of steelmaking methods and the economics of the various processes were presented by Harold T. Clark, manager of the metallurgical research division of Jones and Laughlin Steel Corp. on Nov. 8 before the York Chapter A.S.M.

Dr. Clark amplified his talk by some excellent slides illustrating the historical development of the various steelmaking methods. He analyzed the major factors that control the choice and application of the optimum steelmaking procedure for a given locality. The discussion of the availability and economics of scrap and ore supplies was of particular interest to the members of the chapter.

In his concluding remarks, Dr. Clark presented a brief picture of what the future might hold in store through the application of metallurgical oxygen in the openhearth, blast furnace and bessemer.

Sees Bright Future for Metal-Ceramics



Walter J. Koshuba (Right), of the NEPA Project, Stands Before a Blackboard Illustrating Some Compositions of Metal-Ceramics, subject of His Talk Before the Oak Ridge Chapter. At left is James R. McGuffey, chapter chairman, and center is Lawrence K. Jetter, immediate past chairman

Reported by R. E. Tate
Metallurgist, NEPA Division, Fairchild Engine and Airplane Corp.

The increasingly important field of metal-ceramics was the topic discussed by Walter J. Koshuba at the October technical session of the Oak Ridge Chapter ASM. Mr. Koshuba is supervisor of the materials laboratory at the NEPA Project (Nuclear Energy for the Propulsion of Aircraft).

In this day when engineers are striving to develop higher performance values for aircraft as well as in other propulsion equipment, operating temperatures are climbing rapidly, and metal-ceramics—or cermets, as they are sometimes called—are coming out of the laboratory to meet the challenge. These new combinations offer the possibility of high-temperature materials without an enormous drain on the stockpile of strategic materials.

Dr. Koshuba proposed a classification of cermets into three catagories according to the nature of the metal-ceramic interface. This classification is similar to that used in describing alloy systems. One type includes compositions which exist as mechanical mixtures, as in the silicon-alumina system. Neither reaction nor solid solution occurs. In a second type, solid solution of one phase in the other is evidenced by a change in the lattice parameter of the solvent phase. Titanium-titanium oxide is such a system. The third type is characterized by a solid phase reaction and the formation of a compound. The chrome-alumina system is representative of this type.

The fabrication methods used in producing this new class of materials are essentially those used in the now well-established field of powder metallurgy, where the ingredients in powdered form are compressed in a die at relatively high pressures and are heated either during the pressing operation or subsequently in furnaces designed to reach temperatures as high as 4500° F. A large variety of simple shapes can be produced and most compositions can be successfully machined.

Design data on known metal-ceramic compositions are still in a sketchy state when compared to the data available on stainless steels, and the field of compositions has yet to be thoroughly explored. Metal-ceramics are not expected to excel either metals or ceramics in all high-temperature applications, but it is their combination of properties, the oxidation resistance and high temperature strength of the ceramics and the thermal shock resistance of the metals, that promises a bright future.

Washington Has Its First "Quench and Draw" Party

Reported by George Sorkin
Metallurgist, Bureau of Ships

Members and guests of the Washington Chapter gathered for the October meeting and found a sure cure for research fatigue, metallurgical ossification and bureaucratic rigor mortis. The 1950-51 season got off to a good start with a minimum of technology and a maximum of good fellowship and entertainment.

The executive committee decided this year that it would be a good idea to bring the membership together on a universal footing that would be attractive to long hairs and sales engineers alike. The "Quench and Draw" party provided a medium for intimate discussion as well as horse racing, baseball, movies and other entertainment.

THIRTY YEARS AGO

One of the first orders of business of the new American Society for Steel Treating (formed by amalgamation of its two predecessors in 1920) was the appointment of standing committees. Chairmen were:

For the Finance Committee—W. S. BIDLE*, president, W. S. Bidle Co.; Publication Committee—H. M. BOYLSTON,* Case School of Applied Science; Meetings and Papers Committee—H. J. STAGG, assistant manager, Halcomb Steel Co. (now Crucible); Library Committee—J. C. HARTZELL*, consulting metallurgist; Standards Committee—T. D. LYNCH,* Westinghouse Electric & Mfg. Co.; Research Committee—FRED CRABTREE*, professor, Carnegie Institute of Technology; Constitution and By-Laws Committee—C. E. MACQUIGG, Electro Metallurgical Co. (now dean of engineering, Ohio State University); Nominating Committee—J. FLETCHER HARPER, assistant superintendent, forge shop, Allis-Chalmers Co. (now vice-president, Globe-Union Mfg. Co. and a past president A.S.M.); Membership Committee—T. E. BARKER*, Miehle Printing Press & Mfg. Co.

—30—

The first issue of *Transactions* lists 27 local chapters as against 80 today.

—30—

One of the speakers at the first annual banquet of the new A.S.S.T. was Prof. ALBERT SAUVEUR* of Harvard University, the famed "dean of American metallurgists". Dr. Sauveur's subject was "Steel Wizards, Past and Present".

—30—

The first new chapter to be established after the amalgamation was in Syracuse, N. Y. HOWARD J. STAGG, JR., assistant manager, Halcomb Steel Co. (now merged with Crucible) was elected chairman.

—30—

Change of location of A.S.S.T. headquarters from Chicago to 4600 Prospect Ave., Cleveland, is announced in several large display boxes in the Nov. 1920 issue. The Society stayed at the Prospect Ave. address until 1928, then moved to an office building at 7016 Euclid Ave. The continued growth of the Society forced another move in 1940, when the Society purchased its own quarters at 7301 Euclid Ave., present national office.

—30—

In a paper entitled "A New Method of Case Hardening Steel", WM. J. MERTEN*, metallurgical engineer for Westinghouse Electric & Mfg. Co., describes a method of gas carburizing—then still in the experimental stage.

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* Now deceased.

Poor Heat Treating And Design Can Ruin Expensive Toolsteel

Reported by E. J. Turner
Boeing Airplane Co.

Emphasizing the methods and precautions used in selecting, designing and heat treating toolsteels to obtain their inherent useful characteristics, Stewart G. Fletcher, chief metallurgist, Latrobe Electric Steel Co., presented a technical discussion on "Modern Toolsteels" before the October meeting of the Puget Sound Chapter A.S.M.

Modern mass production industry is based in part on the development of toolsteels, Dr. Fletcher declared. With the wide variety of tooling needs, many characteristics are required for different jobs and often toolsteels are "tailor made" for a particular application. In this way toolsteel development keeps pace with industry.

The six basic types of tool and die steel were then discussed from the standpoint of relative cost, machineability, cold performance, hot performance and heat treating.

Hardenability is often a determining factor in toolsteel selection, the speaker pointed out. Carbon steel hardens to a shallow depth which leaves the core soft and tough. Oil hardening, or the so-called manganese nondeforming steels, are used to prevent change in size on heat treating. The air hardening steels are very safe to heat treat because of little or no cracking or distortion. The high speed toolsteels require high temperature and close control and at times are hard to handle.

Many parts of expensive toolsteel are spoiled by decarburization and scaling during heat treatment. Recent developments in heat treating equipment have produced hardening furnaces with closely controlled atmospheres. The electrically heated salt bath is an excellent method of heat treatment, since the surface of the part is protected by the salt. Of all tools made from high speed steel, a substantial percentage is heat treated and quenched in salt baths.

Poor heat treatment is not the only factor that defeats the purpose of toolsteel. Of cracked tools and dies, over half are the result of errors in design. When designing tools, the 4% volume change from austenite to martensite which takes place during hardening must be considered, since this volume change causes high internal stresses. Sharp corners or sudden changes in section thickness produce stress raisers, and concentration of the internal stresses at these points can cause cracks.

Quality control in modern toolsteel practice involves comprehensive inspection. Ultrasonic inspection added to the prevailing standards enables toolsteel manufacturers to market a sounder product than was previously possible.

In conclusion, it was pointed out that the importance of suitable heat treatment and proper design cannot be overestimated. There is no point in using a sound toolsteel of optimum characteristics if the valuable properties are lost by poor heat treating practice or bad design.

Rowland Is Woodside Lecturer

E. S. Rowland of Timken Roller Bearing Co. (Left) Receives From Detroit Chapter Chairman Don McCutcheon, a Framed Certificate Honoring Him as the Eighth Annual William Park Woodside Lecturer

Reported by Malcolm G. Simons
Pressed Metals of America, Inc.

The Eighth Annual William Park Woodside Lecture was presented before the Detroit Chapter A.S.M. on Oct. 9 by E. S. Rowland, research metallurgical engineer for the Timken Roller Bearing Co. The lecture, honoring Bill Woodside, Detroit Chapter's most prominent founder member and a past national president of the "Steel Treaters," appropriately embraced the subject of "Annealing and Heat Treatment of High-Carbon Steels." Dr. Rowland was introduced by Prof. Clarence Siebert of the University of Michigan.

Spheroidize annealing, particularly as applied to S.A.E. 52100 steels, was one of the subjects treated in Dr. Rowland's lecture. He also explained hardenability relationships in high-carbon steels, and described the determination of mechanical properties of hardened tool steels. The effect of residual stresses in hardened steels was also covered.

Explains De Sy's Theory Of Nodular Iron Formation

Reported by Marvin Evans
Metallurgist, International Harvester Co.

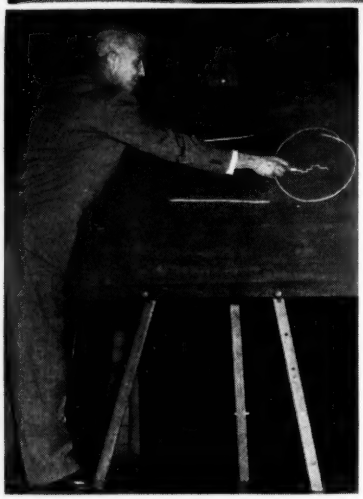
In a well-balanced talk on "Nodular Iron", R. B. Melmoth, foundry research metallurgist for Ford Motor Co., explained the theory of nodulization, presented factual data, and cited examples of practical applications now in development. Mr. Melmoth addressed the first meeting of the Milwaukee Chapter A.S.M. on Sept. 19. A splendid turnout included many guests from the American Foundrymen's Society.

The theory of Prof. Albert de Sy of Belgium, Mr. Melmoth explained, is that the formation of nodular graphite by the addition of magnesium can be attributed to the complete removal of SiO_2 from the melt, and the presence of magnesium compounds of cubic crystalline shape. Based on the assumption that like begets like, the iron will solidify as cubic austenite crystals on these nuclei, therefore retaining the carbon in solution until some lower temperature, where it precipitates out as carbon nodules. This is in contrast to normal gray iron, in which hexagonal crystalline inoculants are used to promote the formation of primary flake graphite (a hexagonal crystal).

Mr. Melmoth described two general types of nodular iron, the high-strength irons and the ductile irons. An excellent series of graphs showed the variation of physical properties of these two irons with varying magnesium content and section size. Photomicrographs were shown to illustrate the variation in microstructure with variation in section thickness; in sections over 4 in. thick, the speaker said, it is sometimes difficult to eliminate the presence of primary graphite.

Mr. Melmoth pointed out the many variables to be controlled in the melting process, and concluded with an assessment of the properties and future possibilities of the material.

Instruments for Metallurgists



Left: Francis G. Tatnall, manager of testing research, Baldwin Locomotive Works, and a Past Chairman of the Philadelphia Chapter, Demonstrates a Point on the Blackboard During His Talk Before That Chapter on "Can a Metallurgist Use Instruments?" Above: A group of chapter members examines an exhibit of instruments displayed by various manufacturers as a supplement to Mr. Tatnall's talk (Reported by George L. Schiel, Chief Metallurgist, Metlab Co.)

Economic Importance of Stainless Steels Stressed

Reported by R. J. Wagner
Gary Screw and Bolt Division

Principal speaker for National Officers' Night of the Calumet Chapter A.S.M. on Oct. 12 was Elmer Gammeter, chief metallurgist, Globe Steel Tubes Co., a national trustee of A.S.M. National Secretary William H. Eisenman was also present and gave the coffee talk. Mr. Gammeter's subject was "Stainless Steels".

In his opening remarks, Mr. Gammeter stressed the economic importance of the stainless steels. Production of stainless increased threefold in the period from 1939 to 1947, while basic steel production scarcely doubled, he pointed out. More recent figures show 400,000 tons of ingots for the first six months of 1950. Of this figure 260,000 tons are of the nickel-chromium austenitic type and 100,000 tons are of Type 430 (17% chromium).

The remainder of Mr. Gammeter's talk was divided into three parts. First he covered the fundamental metallurgical considerations of the various grades. He then explained the classification and applications of the numerous grades into three main groups, namely, martensitic, ferritic and austenitic steels. Finally he told about some failures and misapplications.

Characteristic types of failures, especially in the austenitic group, were illustrated by slides. All of these were due to misapplication, improper cleaning, questionable design, and similar factors.

The speaker particularly emphasized the need for considering the fundamentals of these useful alloys. With such considerations and proper handling, failures in stainless steel products should not be expected.

Sherwood Goes to Battelle

E. M. Sherwood, immediate past chairman of the New York Chapter A.S.M. has taken a new position as research engineer for Battelle Memorial Institute, working in nonferrous metallurgy. He was formerly project engineer for the armament division of Sperry Gyrascope Co.

Compliments

To SAMUEL L. HOYT, technical advisor, Battelle Memorial Institute, on the Outstanding Achievement Medal conferred by University of Minnesota, primarily for his early work on hard metal carbides.

♦ ♦ ♦

To HOWARD S. AVERY, research metallurgist, American Brake Shoe Co., on the award of the 1950 Lincoln Gold Medal of the American Welding Society for his paper on "Hot Hardness of Hard Facing Alloys" published in *Welding Journal*.

♦ ♦ ♦

To WENDELL F. HESS, head of the department of metallurgical engineering at Rensselaer Polytechnic Institute, on the award of the Samuel Wylie Miller Memorial Medal by the American Welding Society, for his conspicuous contribution to the advancement of welding and cutting.

♦ ♦ ♦

To OLIVER SMALLEY, president, Meehanite Metals Corp., on the award of the Gold Medal of the Gray Iron Founders' Society, Inc., for his outstanding contribution to the scientific advancement of the industry.

Surface Stressing Used To Cure Fatigue Weakness

Reported by James W. Poynter
Metallurgist,
Wright-Patterson Air Force Base

Speaking on "Fatigue Weakness of Surfaces" at the Oct. 11th meeting of the Dayton Chapter A.S.M., J. O. Almen, well-known research consultant of Detroit, pointed out that the present methods of measuring fatigue strength measure surface imperfections and *not* the strength of the material. Mr. Almen referred to rotating beam, push-pull, and similar types of equipment.

The stresses existing in the surface layers (whether compressive or tensile) greatly affect the strength of a given part under repeated stress, he showed. Diagrams were used to illustrate how stresses can be produced in the surface layers in such a way as to oppose the stresses applied in service and thus improve the part.

Such stresses can be produced by heat treatment, by carburizing, nitriding, peening, or combinations of these treatments. Shot peening a part while it is stressed almost up to the yield point is one of the more interesting methods.

The magnitude of the surface compressive stresses that can be utilized is limited by the maximum tensile stresses that can be set up in the core to balance the surface stresses without exceeding the tensile strength of the material, Mr. Almen explained.

More Development Needed Before Titanium Alloys Become Generally Useful

Reported by Godfrey A. Stemple

Consolidated Gas, Electric Light and Power Co., Westport Power Production Station

Titanium, or at least titanium alloys, is passing from the "Cinderella metal" stage to a more realistic status, L. W. Eastwood, supervisor in nonferrous metallurgy, Battelle Memorial Institute, told the Baltimore Chapter A.S.M. on Sept. 18. In this respect, the public is beginning to realize that much remains to be done before the alloys become generally useful outside the laboratory, he said.

The production of the metal by the decomposition of TiI_4 heat (the Van Arkel process) or the reduction of $TiCl_4$ with magnesium (the Kroll process) is now generally familiar. Likewise, it is known that titanium alloys can be melted by induction, by arc melting in graphite using an argon atmosphere, or by arc melting in a water-cooled copper crucible, using a tungsten electrode and an argon or helium atmosphere.

Several heat treatable alloys have been developed at Battelle for the Wright-Patterson Air Force Base which have ultimate strength of 185,000 psi., 170,000 psi. yield strength, and 6 to 10% elongation, with good "warm" forming characteristics, excellent resistance to corrosion, and other desirable engineering characteristics. These alloys have ultimate strength-weight ratios 1.4 times that of 75S-T and 2.1 times that of half hard stainless No. 302. Their yield strength-weight ratios are 1.45 and 2.6 times higher, respectively.

Uniform, good-quality ingots of the alloys are still difficult to produce, and much remains to be done on improved and cheaper methods of making the metal. As yet, there is no known refractory suitable for containing molten titanium-base alloys, and methods are needed for heat treating sheet without surface damage. High-strength alloys are hardened by heat treating or by aging the hot rolled material, but little is known about the mechanism of such hardening. Titanium may be the "Cinderella" of metals, but a great deal of development is needed before its alloys can play an important role in national defense or in other fields.

The coffee talk at the meeting was given by Howard Wampler of the Waverly Press on "Scientific Publication".

Fletcher at Los Angeles

Reported by C. E. Levoe

Metallurgist, Menasco Mfg. Co.

"Modern Toolsteels—Their Characteristics and Handling" was the title of a talk given by Stewart G. Fletcher, chief metallurgist of the Latrobe Electric Steel Co., before a joint meeting of the Los Angeles Chapters of A.S.M. and the American Society of Tool Engineers in October.

Although hundreds of toolsteels have been developed in the past 50 years, new ones are constantly being introduced to meet new needs, Dr. Fletcher said. How the heat treatment of toolsteels has graduated from an art into a science was demonstrated by the speaker in his talk, a resume of which is published on page 13 of this issue.

Gammeter Promoted by Globe Steel Tubes Co.

Elmer Gammeter, formerly chief metallurgist, has been appointed director of laboratories for the Globe Steel Tubes Co. He is a national trustee of the American Society for Metals.

E. Gammeter

Mr. Gammeter is a graduate of Missouri School of Mines, where he received both his Master of Science and Metallurgical Engineering degrees. He has been with Globe Steel Tubes since 1943. Prior to that he was manager of the stainless steel metallurgical bureau of Carnegie-Illinois Steel Corp., following six years as metallurgist for Edison General Appliance Co.

A chairman of the Chicago Chapter A.S.M. in 1937-38, Mr. Gammeter is also active on several technical committees of the American Society for Testing Materials and the American Iron and Steel Institute.

Mr. Gammeter succeeds the former director of laboratories, Dr. H. K. Ihrig, who has resigned to become vice-president in charge of research for Allis-Chalmers Mfg. Co.

Bain Highlights Half-Century in Metals

Over 150 Members of the Lehigh Valley Chapter Heard Edgar C. Bain (Center), Vice-President of Carnegie-Illinois Steel Corp., Speak on "A Half-Century of Metallurgical Progress" (Reported in November Metals Review, *Page 9). C. H. Herty, Jr. (left), assistant to the vice-president, Bethlehem Steel Co., introduced the speaker. At right is J. F. Libsch of Lehigh University, chapter chairman (Reported by Frank H. Laxar, Instructor, Lehigh University)*

Nodular Graphite Cast Iron Described by C. K. Donoho

Reported by J. L. Foster

Metallurgist, Goodyear Aircraft Corp.

The relatively new "Nodular Graphitic Cast Iron" was the subject of a talk given at the October meeting of the Akron Chapter by Charles K. Donoho, chief metallurgist of the American Cast Iron Pipe Co.

The process was described as a fascinating metallurgical idea, whose underlying principles are now well known. In American practice using magnesium as a nodulizer, the rate of reaction is very high and considerable work is being done to perfect the magnesium alloys used. In any event, ferrosilicon should be added after the magnesium, since it acts as an additional inoculant.

From experience at American Cast Iron Pipe Co., the basic-lined cupola has been found best for producing the low-sulphur iron required as a base metal.

The coffee talk was presented through the courtesy of the East Ohio Gas Co., in the form of a sound movie "Our Silent Partner."

Baldwin Adds New Vocabulary Term in Lecture on Fracture at Pittsburgh

Reported by Shadburn Marshall
Research Associate
Carnegie-Illinois Steel Corp.

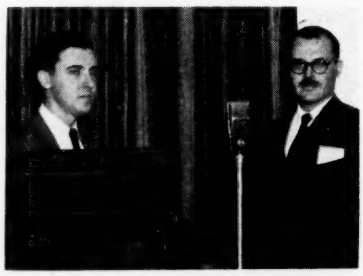
Members and guests attending the October meeting of the Pittsburgh Chapter A.S.M. added a new phrase to their metallurgical vocabularies, when they heard about "rheotropic embrittlement" from W. M. Baldwin of Case Institute of Technology. This new term was selected to denote the phenomenon wherein the fracture behavior of certain metals is markedly modified by prior plastic flow. The nature of rheotropic embrittlement has been under intensive study by Professor Baldwin and his colleagues, and their findings are doing much to clarify some of the mysteries surrounding the fracture problem.

In his introductory remarks, Dr. Baldwin reviewed briefly some of the general features of fracture, including the effects of such external variables as strain rate, temperature, and state of stress. Many metals suffer no serious loss of ductility as the temperature is lowered, as the strain rate is increased, or as triaxial tensile stresses are introduced. Another class of metals, on the other hand, may show abrupt losses of ductility under such changes of external conditions. It is in this class of metals that rheotropic embrittlement comes into play.

In the first type of metal, the effect of prior plastic deformation at one temperature upon the ductility at another temperature is straightforward. If half the ductility is used up at the first testing temperature, the metal will exhibit half the ductility at the second temperature that it would have possessed with no previous strain. In other words, the remaining ductility is inversely proportional to the fraction of the ductility used up in the prior straining.

The behavior in metals subject to rheotropic embrittlement is much more complex. Most of the experiments described involved prestraining tension bars at room temperature followed by testing to fracture at liquid nitrogen temperature. The effect of small prestrains is to lower slightly the initial ductility at the low temperature. As the prestrain is increased, however, the ductility at the low temperature begins to increase, passes through a maximum and then decreases to zero. The maximum ductility at the low temperature may be several times the ductility of material with no prestrain.

Dr. Baldwin suggested that the initial embrittlement is brought about by some obstruction to slip which is operative at low temperatures. Slip is confined to a few slip planes so that the capacity to slip is exhausted before a large over-all deformation can occur. If slip on a large number of planes is nucleated by straining at room temperature, the obstructive influence is overcome and many slip planes can participate in the deformation at the low temperature. As still greater prestrains are used, the exhaustion of ductility under the prestraining conditions takes over and a normal linear decrease of remaining ductility with increasing prestrain is observed.



W. T. Lankford, (Left) Research Associate, Carnegie-Illinois Steel Corp., Served as Technical Chairman and Introduced the Speaker, W. M. Baldwin (Right), Research Professor at Case Institute of Technology

Dr. Baldwin indicated that these experiments are being extended by varying the conditions of prestrain and the final conditions of testing.

The lecture was profusely illustrated by Kodachrome lantern slides —an effective aid in visualizing the large number of three-dimensional plots used in the lecture. During the discussion, other examples of rheotropic embrittlement were cited by various members of the audience.

Amazing Advances Ascribed To Modern Cold Forging

Reported by G. A. Warwick
Works Laboratory, General Electric Co.

The amazing modern achievements of cold forging machines and processes were highlighted by R. G. Friedman, vice-president of the National Machinery Co., to members and guests of the Ft. Wayne Chapter A.S.M. at the Oct. 9 dinner meeting and technical session.

Mr. Friedman briefly described the early history of cold headers and then continued his discussion with some actual case histories and sample displays of intricate cold forged machine parts and fasteners.

The audience was particularly interested in the speaker's discussion of the punch and die steels used to withstand the high pressures necessary for the extreme plastic flow required in present-day cold forgings. Emphasis was further placed on the plans for continued expansion of the cold forging industry through new developments involving metallurgical and mechanical properties of die steels and forging materials and advanced knowledge of machine and tool design.

In conclusion, the technical presentation was complemented by motion pictures showing the manufacture of many parts by cold forging. Mr. Friedman provided explanatory comments during the movie.

General Motors Plays Host

Leaders at the Oct. 11th Meeting of Worcester Chapter A. S. M., Left to Right: E. Roland Ljungquist, Superintendent of Lodding Engineering Corp., Technical Chairman; James H. Hartwell, Service Representative for Massachusetts and Rhode Island of the Buick Division of General Motors Corp., Who Spoke on "Torque Converter Transmissions", and Robert S. Morrow of George F. Blake, Inc., Chapter Chairman, Who Presided. The October get-together included an inspection trip through the Framingham plant of General Motors Corp. in the afternoon and a dinner meeting at the Marlboro Country Club. (Reported by C. Weston Russell, Wyman Gordon Co.)

Will It Do the Job? Is Basic Question In Material Selection

Reported by George F. Kappelt
Chief Metallurgist, Bell Aircraft Corp.

"Do not rule out of consideration the material that stands up in service; do not dote over the material that stands up in service." This paradoxical philosophy was given to the members of the Buffalo Chapter A.S.M. at their October meeting by H. B. Knowlton, supervisor of materials engineering, International Harvester Co.

Mr. Knowlton, in his talk on "Properties of Steel and Performance of Steel Parts", stressed the basic consideration: "What does it take to do the job?" He pointed out the well-known but often forgotten fact that it is rare, indeed, when the solution which seems ideal from the standpoint of structure and properties observed in the laboratory, is found to be the best solution from a commercial point of view. He quoted Kettering as stating that the ideal material is the cheapest one which will do the job. The first requirement is that it must do the job. Second only to successful performance comes the cost to the ultimate consumer.

If we use more expensive materials than are needed to guarantee 100% satisfactory performance, we must charge our customers more money than we should for our product. Thus, it is often desirable to determine just what properties are actually needed in order to guarantee safe performance. To elaborate on this thinking, Mr. Knowlton showed how parts can stand up or fail in service. A typical example was an axle that was heat treated so as to produce ideal properties from the standpoint of static torsion tests. These axles failed in service, however.

Investigation finally showed that the axle was failing in a perfectly ductile manner from the corner of a splined slot. This problem was solved by lowering the hardness and the static torsional strength from the figures which had previously been considered ideal, but increasing the ductility sufficiently to permit some plastic deformation, and a better distribution of stresses among all of the splines.

In the evaluation of parts, Mr. Knowlton warned that one of the chief reasons for the failure of some of the ideals selected by the laboratory is that these ideals were based upon tests which did not duplicate the conditions which produce service failures. Figures were presented illustrating how notch impact strength and impact transition temperatures may give misleading results. The impact transition temperature is a measure of the inherent toughness of the steel. The degree of toughness required for any given application, however, depends upon the operating temperature, the velocity of stress application, and the degree of stress concentration inherent in the design.

In general, low temperatures, sharp notches, and high velocities increase the tendency toward brittleness. On the other hand, if the production part has less stress concentration, or a lower velocity of stress application than the impact specimen, the temperature for safe operation may be considerably lower than that observed in the transition temperature tests on conventional notched impact specimens. For example, some of the steels successfully used for automotive leaf springs have relatively high transition temperatures.

By the time Mr. Knowlton finished his talk, every member present was vividly conscious of the question "Will it do the job?"

Wear Talk Excites Interest

Reported by Walter C. Struchen
Chemist, Erie Forge Co.

National President's Night of the Northwest Pennsylvania Chapter A.S.M. was held on Sept. 21 at the ever-popular General Electric Community Center in Erie. President Arthur E. Focke was the honored guest and speaker, presenting the topic of "Wear and Wear Testing".

The unusual interest of the group in this topic prolonged the meeting into a lively discussion period.

Chicago Has "Steel Treaters' Night"

At Chicago Chapter's Speakers' Table on Steel Treaters' Night Are, Left to Right: Wm. E. Mahin of Armour Research Foundation, Chapter Chairman; W. H. Eisenman, National Secretary of A. S. M.; H. F. Kincaid of International Harvester Co., Who Spoke on Induction Hardened Gears; W. C. Troy, Also of Armour, Technical Chairman; and C. T. Prendergast of Western Electric Co., Program Chairman for the Chapter

Reported by Thomas S. Simms
Research Information Service
John Crerar Library

Special significance was added to the Chicago Chapter's annual "Steel Treaters' Night" on Oct. 9 by the presence of Executive Secretary Bill Eisenman, who talked to the group prior to the evening address in his own inimitable style. Principal speaker of the evening was H. F. Kincaid, assistant works metallurgist, Farmall Works, International Harvester Co., who spoke on "Induction Hardened Gears".

Parts ranging in size from small oil pump gears to large final-drive gears having a 32-in. diameter and a 4-in. face are treated at the various Harvester plants. Three methods of induction heating may be used, namely, those employing frequencies of 9600 cycles or less, referred to as A.F. (audio frequency), frequencies above 9600 cycles referred to as R.F. (radio frequency), and a combination of A.F. and R.F. frequencies.

The high production possible in the induction hardening of special types of gears was clearly illustrated by the unit operating at the Louisville Works. This automatic machine hardens up to 900 transmission gears per hour in the radio-frequency range.

In treating the heavier types of gears, a unique method has been developed at the Tractor Works in Chicago. A preheating furnace brings the gears up to 600° F. prior to induction hardening. The gears are taken from the preheat furnace and placed in a special hardening unit, equipped with a rotating spindle and indexing cylinder, which lowers the gear from the inductor into the water-spray quench ring located in the bottom of the tank.

The advantages of induction heating, as pointed out by Mr. Kincaid, are the elimination of machining operations which were previously required to remove a large proportion of the distortion caused by conventional heat treating methods, and lower material costs made possible by the use of carbon steel in place of alloy steel.

Stainless 'Passivity' Is Attributed to Adhesion of Gas

Reported by Orlo E. Brown
Robertshaw-Fulton Controls Co.

The "unexpected" corrosion resistance offered by stainless steels, as well as the corrosion resistance that is expected, was explained by Mars G. Fontana, head of the department of metallurgy of Ohio State University, before the Los Angeles Chapter A.S.M. at its first fall meeting.

Conditions of corrosion and of corrosion resistance were both illustrated by slides. The difference between these two conditions has often been attributed to "passivity". Dr. Fontana defined this term very simply as the condition of metal which does not corrode when it should.

Work done in the metallurgy department at Ohio State, Dr. Fontana said, tends to prove that in many instances this passivity of stainless steel is produced by gas adhering to the surface. Several ingenious experiments have been run to show that some of the corrosion resistance of stainless steel may be destroyed merely by exposure to a vacuum. Upon contact with air, such stainless again becomes passive.

Other tests were cited to substantiate Dr. Fontana's viewpoint that this kind of corrosion resistance is the result of a physical adhesion of gas rather than chemical resistance. The passive film is quite delicate in nature, he said, and is readily destroyed under many conditions.

Wide acceptance of Types 347 and 321 stainless as completely stabilized was questioned by Dr. Fontana. Stating that the addition of columbium or titanium is not a cure-all, he showed slides to prove that under welding heats stabilization sometimes disappears, and the weld may fail through "knife-line" corrosion. The mechanism of this type of failure was described.

Dr. Fontana concluded by stressing the need for close coordination between the selection tests and service conditions when making a choice of stainless steel.

North Texas Sees Two Movies

Reported by Arthur C. Willis
Instructor, Southern Methodist University

The regular meeting of the North Texas Chapter A.S.M. was held on Oct. 11 at Southern Methodist University. Present were 29 members and 10 guests.

Two films, were presented at the meeting, namely, "Metal Crystals" and "Iron-Carbon Alloys". Following these, a 30-min. talk covering the iron-carbon equilibrium diagram was given by Arthur C. Willis, instructor in metallurgy at the School of Engineering, Southern Methodist University.

Tells About Light Metal Forging

At October Meeting of the Eastern New York Chapter Are, From Left: A. A. Burr of Rensselaer Polytechnic Institute, Program Chairman; A. J. Pepin of Wyman Gordon Co., Who Spoke on Press Forging; and J. F. Eckel of Knolls Atomic Power Laboratory, Chapter Chairman

Reported by A. Lesnewich
Rensselaer Polytechnic Institute

The capabilities of the largest forging press in the United States formed the major topic of discussion at the Oct. 9th meeting of the Eastern New York Chapter A.S.M. A. J. Pepin, quality and research engineer of the Wyman Gordon Co., spoke about "New Developments in the Forging of Metals."

Mr. Pepin explained that the broad use of aluminum alloys, and plain carbon, alloy, and stainless steels in the United States has resulted in extensive development of drop hammer forgings. High-strength magnesium alloys, however, require the slow action of a press for the production of forgings.

Since the Germans had quantities of magnesium available, they developed forging techniques for this metal to a point which required the construction of a 30,000-ton press. This unit is now in the U.S.S.R. The 18,000-ton forging press, largest in this country, was built by Mesta and installed at the Worcester Division of the Wyman Gordon Company in May 1946.

Wrought material of the size necessary to produce the large forgings is not available, so the forge operators must be satisfied to accept cast ingots for their raw material. These ingots must be kneaded on flat dies in three perpendicular directions, commonly called cross working, in order to break down the dendritic structure and improve the porosity. Since this cross working procedure is not as effective with light alloys as with ferrous materials, very high quality cast ingots are needed. Aircraft quality aluminum alloy is necessary, especially on air frame forgings which are subject to fatigue stresses in service.

Mr. Pepin concluded his presentation with an excellent motion picture entitled "Large Light Metal Press Forgings," produced by the Wyman Gordon Co. This movie showed all of the stages in the production of large aircraft forgings from the die sinking operations to the final ultrasonic testing.

Telephone Developments Traced at Des Moines

Reported by L. F. Janssen
John Deere Des Moines Works

The October Meeting of the Des Moines Chapter A.S.M. proved to be a successful second annual "Ladies' Night" with a program equally as interesting to the guests as to the regular members.

Principal speaker was C. D. Peebler, executive assistant of the Northwestern Bell Telephone Co., who presented an explanation of the telephone communication system. Speaking on "Super-Highways of Communication", he traced its development from the earliest single-wire telephones to the modern systems which make use of coaxial cable.

The speaker carried a vast supply of demonstration material which he used advantageously to clarify some of the more complex telephone operations and materials. These included the coaxial cable, the function of crystals and radio tubes, and the possibilities of the modern transister which is in experimental use only at the present time.

Studies of M-Value Used To Predict Drawability Of Different Lots of Steel

Reported by John C. Wagner
Research and Test Department
Indianapolis Naval Ordnance Plant

A study of "m-value" has enabled General Electric metallurgists to predict the drawability of different lots of steel, John C. Fisher told the Indianapolis Chapter on Oct. 16. Dr. Fisher, who is with the G. E. research laboratory, spoke on "The Plastic Flow of Metal."

In plotting stress-strain curves, Dr. Fisher explained, the changing diameter of the specimen should be used in calculating stress instead of the original diameter. When the log of true stress is plotted against the log of the true strain, a straight line results, the slope of which is called the m-value. This m-value represents the rate of work hardening.

Thus, he continued, if a metal work hardens too slowly (low m-value), it will break at the thin sections during drawing; also, if it work hardens rapidly (high m-value), it will be able to withstand a more severe draw.

Dr. Fisher then showed how single crystals are used to study the mechanism of plastic flow. Practically all commercial metals deform by the process of slip. The presence of dislocations, which are incomplete atomic planes, allows slip to take place. The theory of plasticity explains how the strength of metals is increased by making the motion of dislocations more difficult.

Slip does not occur so readily in solid solutions as in pure metals, because of the difference in the size of the solvent and solute atoms. Alloying elements in steel increase resistance to slip by the formation of carbides. There is evidence to show that the closer the carbide particles are to each other, the stronger the steel will be.

Dr. Fisher's talk was followed by a lively discussion which was terminated only because of the lateness of the hour.

Almen Speaks at Rockford

Reported by Wilhelm Olson
Atwood Vacuum Machine Co.

J. O. Almen, research consultant at General Motors, is neither unorthodox nor unconventional in his treatment of metallurgical problems. But he is definitely bold and unrestricted by concepts that are based on custom and common usage, yet are not proven in fact. Because of this trait his presentation is always original, and his talks interesting and challenging, bringing to his hearers a new approach to old jobs.

Mr. Almen presented such a challenging talk at the October meeting of the Rockford Chapter A.S.M. on "Surface Weakness of Metals." A brief summary of his remarks is contained in the Dayton Chapter report on page 14.

Aluminum Consumption Trends Noted

In a Jovial Mood at the First Fall Meeting of Saginaw Valley Chapter Are, From Left: Norton Nichols, Secretary-Treasurer of the Chapter; E. H. Dix, Jr., the Speaker; and Frank A. Simons, Chairman

Reported by W. Manuel
Metallurgist, AC Spark Plug Division G.M.C.

The recent trend in aluminum alloy products was the theme of the first fall meeting of the Saginaw Valley Chapter A.S.M. on Oct. 17. The speaker, E. H. Dix, Jr., assistant director of research, Aluminum Research Laboratories, Aluminum Co. of America, pointed out that on a volume basis the production of aluminum in this country now ranks second only to that of iron and steel. Its cost has decreased, while the cost of other nonferrous metals has increased.

Higher productive capacity and lower cost of aluminum alloy products make the use of aluminum increasingly attractive to the automotive industry, Mr. Dix explained. Fabricators are using about 25% of the aluminum being produced by Alcoa today and are classed as the largest consumer. The use of aluminum for automotive products is increasing but is far below the amount used at one time. As an example, Mr. Dix described the many parts used in one experimental automobile (now in the Ford Greenfield Museum).

Aided by slides, Mr. Dix discussed the various temper designations for aluminum alloys, their chemical compositions, their physical properties, and their primary uses.

The progress which has been made in soldering, brazing and welding has contributed to increased use of aluminum alloys, Mr. Dix pointed out. Non-corrosive fluxes are finding successful use in the soldering of aluminum. Progress has been made in all welding processes, but the biggest recent change has been the development of the inert-gas shielded-arc method of welding.

Extensive corrosion tests are being conducted at all times by Alcoa. Developments in chromium plating on aluminum alloys have resulted in plates with much better corrosion resistance and more attractive surface.

Some of the most recent developments in the automotive industry are in the use of aluminum alloys for bearings, wheels, torque converters, pistons and rear axle housings.

Hear About Ferro-Alloys

Reported by J. H. Bradbury
Metallographer,
Algoma Steel Corp., Ltd.

Speaker at the October dinner meeting of the Northern Ohio Chapter A.S.M. was D. V. Hamilton, manager of Canadian and overseas sales for Chromium Mining & Smelting Corp., Ltd. Mr. Hamilton is well qualified to speak on his subject of "Manufacture of Ferro-Alloys" by his background as works manager of the Sault Ste. Marie plant of his company.

Mr. Hamilton traced the history of electric furnaces used in the production of ferro-alloys, and described the products of these furnaces and their applications in the steel industry. A point of local interest brought out by the speaker was the fact that Dr. Heroult and an assistant experimented with the production of pig iron in the electric furnace in Sault Ste. Marie in 1906.

CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Akron	Jan. 10		Roy Hayworth	Wear
Boston	Jan. 5	Shelton Hotel	A. B. Kinzel	Alloy Steels
Chattanooga	Jan. 9	Maypole Restaurant	Vincent T. Malcolm Sidney Low	Modern Methods of Tests and Inspection
Chicago	Jan. 22	Furniture Mart	W. E. Jominy	Hardenability of Steel—Present Status
Cincinnati	Jan. 11	Engineering Society	Jack T. Wilson	
Cleveland	Jan. 8	Tudor Arms Hotel		Students Night, Stump The Experts
Columbus	Jan. 3	Broad St. Church of Christ	R. C. McMaster	Predicting Service Performance by Nondestructive Tests
Detroit	Jan. 8		F. G. Tatnall	Metallurgy, Design and Engineering Specifications
Fort Wayne	Jan. 8	Chamber of Commerce	R. B. Saltonstall	Electroplating
Hartford	Jan. 9		James W. Fifield	Ductile Cast Iron
Lehigh Valley	Jan. 5		J. P. Gill	Modern Developments in Tool and Die Steels
Kansas City	Jan. 17	Fred Harvey Pine Room		
Los Angeles	Jan. 25	Rodger Young Auditorium	Pol E. Duwez	Atomic Work on Metals
Louisville	Jan. 9	Kapfhammer's Party House	C. O. Burgess	Nodular Cast Iron
Mahoning Valley	Jan. 9	Post Room, V.F.W.	M. Tennenbaum	Steelmaking
Milwaukee	Jan. 23	City Club	W. E. Jominy	Reducing Wear by Proper Metallurgy
Montreal	Jan. 3	Spanish Room, Queen's Hotel	J. U. MacEwan	Movie Night
New Haven	Jan. 18	Hotel Barnum Bridgeport	Sam Tour	Hot Spot Machining
New Jersey	Jan. 15	Essex House, Newark	Arnold Rustay	Aluminum and Magnesium Forgings
New York	Jan. 8	2 Park Ave.	E. H. Dix, Jr.	Aluminum Alloys
North Texas	Jan. 10	Fort Worth	Vincent T. Malcolm	Recent Advances in Metallurgy
Northern Ontario	Jan. 17	Windsor Hotel Sault Ste. Marie	M. Kelley	Diesel Engines in Railroading
North West	Jan. 18	Covered Wagon	Elmer Gammeter	Stainless Steels
Notre Dame	Jan. 10	Engineering Bldg., Univ. of Notre Dame	Elmer Gammeter	Stainless Steels
Ontario	Jan. 5	Royal York Hotel, Toronto	H. G. Warrington	Canadian Production of Alkali Earth Metals
Ottawa Valley	Jan. 9	Mines Branch	C. H. Golden	The Design of Experiments
Penn State	Jan. 9	Mineral Industries Art Gallery	E. E. Thum	Metallurgical Aspects of Atomic Energy
Peoria	Jan. 8	Jewel Crown Room	W. B. Meyer	Metallizing
Philadelphia	Jan. 26	Engineers Club	H. F. Taylor	Castings
Pittsburgh	Jan. 11	Roosevelt Hotel	H. W. Graham David H. Currie	Raw Materials Quality as Affecting Iron and Steel Making
Purdue	Jan. 16	Purdue Union	Peter C. Dooley	Grinding
Rhode Island	Jan.			Thaw
Rochester	Jan. 8	Elks Club	Samuel Epstein	Metallurgical Aspects of Deep Drawing
Rockford	Jan. 24	Faust Hotel	G. E. Brumbach	Air Hardening Toolsteels
Rocky Mtn.				
Denver	Jan. 19	Oxford Hotel	J. T. Wilson	Solar Radiation
Pueblo	Jan. 18	Minequa Club	J. T. Wilson	Solar Radiation
Saginaw Valley	Jan. 16	Fischer's, Frankenmuth, Mich.	Charles Gardener, Walter Naas	Surface Cleaning
St. Louis	Jan. 11	DeSoto Hotel	George A. Sands	Stainless Steel
Southern Tier	Jan. 8	Mark Twain Hotel, Elmira, N. Y.	Howard J. Stagg	Some Aspects of Tool Steels
Springfield	Jan.	Hotel Sheraton	R. G. Friedman	Latest Development in Forgings
Terre Haute	Jan. 8	Indiana State Teachers College Student Union	H. L. Smith	Bearings
Texas	Jan. 9	Ben Milam Hotel, Houston	H. S. Avery	Abrasion Resistant Alloys
Toledo	Jan. 18	Maumee River Yacht Club	W. E. Jominy	Reducing Wear by Proper Metallurgy
Tri-City	Jan. 9	Rock Island Arsenal Cafeteria	W. T. Bean, Jr.	Application of Experimental Stress Analysis
Tulsa	Jan. 8		V. T. Malcolm	Heat Resistant Alloys
Utah	Jan. 30	Newhouse	Vincent T. Malcolm	Welding of High-Pressure, High-Temperature Steels

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Warren	Jan. 11		R. B. Kropf	Aircraft Steels
Washington	Jan. 8		John H. Hollomon	Phase Transformations in Precipitation Hardening
West Michigan	Jan. 15	Morton House, Grand Rapids	Panel Discussion	Information Please
Worcester	Jan. 10	Worcester Tech.	B. E. Warner	Surface Protection of Metals
York	Jan. 10	Elmwood Grill	J. R. Townsend	Plastics and Metals in Engineering

IMPORTANT MEETINGS
for January

Jan. 8-12—Society of Automotive Engineers. Annual Meeting and Engineering Display, Hotel Book-Cadillac, Detroit. (John A. C. Warner, secretary and general manager, S. A. E., 29 West 39th St., New York 18.)

Jan. 9—Society for Applied Spectroscopy. Meeting on Quantitative Chemical Analysis by X-Ray Absorption Spectroscopy, Socony-Vacuum Training Center, New York, (Henry H. Hausner, Nichols Bldg., Room 108, New York University, University Heights, New York 53.)

Jan. 10-12—American Institute of Electrical Engineers, jointly with **Institute of Radio Engineers** and **National Bureau of Standards.** Second High-Frequency Measurements Conference, Hotel Statler and Department of the Interior, Washington, D. C. (Prof. Ernst Weber, chairman of joint committee, c/o Microwave Research Institute, Polytechnical Institute of Brooklyn, Brookyn, N. Y.)

Jan. 15-18—American Society of Mechanical Engineers, jointly with **Society for the Advancement of Management.** Plant Maintenance Show and Conference, Public Auditorium, Cleveland. (Clapp and Poliak, Inc., 341 Madison Ave., New York 17.)

Jan. 18-20—Society of Plastics Engineers. Seventh Annual National Technical Conference, Hotel Statler, New York. (S.P.E., 409 Security Bank Bldg., Athens, Ohio.)

Jan. 22-26—American Institute of Electrical Engineers. Winter General Meeting, Hotel Statler, New York. (A. I. E. E., 33 West 39th St., New York 18.)

Jan. 29—Feb. 1 — Institute of the Aeronautical Sciences. 19th Annual Meeting, Hotel Astor, New York, (R. R. Dexter, secretary, I. A. S., 2 East 64th St., New York 21.)

Air Hardening Toolsteels Compared to Oil Hardening

Reported by W. B. Moore
Technical Service Engineer
Reynolds Metals Co.

Jack Koch, assistant regional manager for the Carpenter Steel Co., singled out "Air Hardening Toolsteels" as the subject for his talk before the Louisville Chapter on Oct. 3. Mr. Koch compared the three standard air hardening steels to the three most common oil hardening steels.

With water and oil hardening steels, he pointed out, the three outstanding problems are quench cracks, warping and size change. The more rapid the quench, the more pronounced are these problems. In air hardening steels, on the other hand, since cooling is primarily a radiant function, the piece cools slowly and uniformly, and quench cracks and warpage can therefore be eliminated and size change can be controlled and predicted.

Mr. Koch enumerated certain problems likely to be encountered in the use of air hardening toolsteels and prescribed treatment for eliminating them. At the conclusion of his talk, many questions were presented by the members, and were satisfactorily answered by the speaker.

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A. S. M. Members' Names Added to Quarter-Century Club Roster

The following A.S.M. members have been awarded honorary certificates commemorating 25 years' consecutive membership in the Society:

Calumet Chapter—Carl C. Mahlie, Ray F. Main, A. J. Scheid, Jr., Thomas S. Washburn, J. F. Woschitz.

Cleveland Chapter—J. S. Adelson, Clifford R. Augden, James S. Ayling, George N. Barrett, Jr., Edward C. Bartlett, Ray T. Bayless, B. L. Benbow, George Bissett, Hugh E. Brown, A. S. Cogan, William C. Corbeau, Gerald M. Cover, R. J. Cowan, E. A. Cowles.

C. W. Derhammer, C. P. Diemer, H. R. Doswell, Joseph E. Dvorak, William H. Eisenman, J. V. Emmons, T. B. Focke, Wm. C. Fox, John H. Friedman, K. W. Grant, James B. Griffin, Donald M. Gurney, Lowell E. Guscott, Paul J. Gygi, Carl L. Harvey, Elmer B. Hauser, Allen E. Hibschman, T. J. James, Nicholas A. Jannetto, Zay Jeffries, T. E. Jerabek, Louis A. Jodkuhn, Charles H. Junge.

Elmer Keidel, R. E. Kerslake, J. F. Kirwan, E. C. Knuth, G. H. Ledl, Harvey L. Lee, Adam F. Moranty, R. T. Morrow, George T. Motock, W. J. Murphy, Richard W. Parsons, F. E. Phelps, E. G. Pierce, Raymond Rolf. C. B. Sawyer, O. B. Schultz, Harry A. Schwartz, W. S. Scott, C. G. Shontz, Earle C. Smith, Henry H. Smith, Roy H. Smith, Theron D. Stay, W. P. Sykes, F. C. Techmyer, E. E. Thum, Milton Tilley, Victor F. J. Tlach, Michael Tomko, A. S. Townsend, Kent R. Van Horn, Ralph J. Venning, Henry F. Vlchek, I. Edmund Waechter, G. D. Welty.

Sustaining Members: Allegheny Ludlum Steel Co., W. S. Bidle Co., Carpenter Steel Co., Case Institute of Technology, Cleveland Wire Spring Co., Columbia Tool Steel Co., Darwin & Milner, Inc., J. W. Kelley Co., United Screw & Bolt Corp., Warner & Swasey Co., Wheelock Lovejoy & Co., Inc.

Detroit Chapter—E. H. Stilwill.

Golden Gate Chapter—Marshall E. Blakeslee, Welton Joseph Crook, Frank B. Drake, John R. Gearhart, Walter Grothe, D. Hanson Grubb, J. H. Gumz, Samuel W. Hilt, M. W. Hulse, Thomas S. Hutton, Evan R. Nash, D. B. Reeder, E. A. Wilcox. Sustaining memberships: Allegheny Ludlum Steel Corp., California Saw Works (Myron Bird, representative), Industrial Steel Treating Co., (S. H. Edwards, representative), Earle M. Jorgensen Co.

National and International (no chapter affiliation)—Charles S. Burch, Arthur W. Carrier, Richard D. Clemson, C. H. Desch, W. P. Fishel, Richard Harriss, Sir Andrew McCance, A. Lewis Roberts, Thomas Roberts, Francis W. Rowe, J. A. Stewart, T. Henry Turner.

New Haven Chapter — Percy L. Clark, Alton V. Pollard, Joseph M. Weil.

New York Chapter—R. H. Aborn, R. C. Angell, Robert S. Archer, Alexander Benecke, H. S. Blumberg, Douglas Boyd, Frances Hurd Clark, J. J. Crowe, Myron Park Davis, Wm. E. Day, Jr., Erik V. Enevik, J. B. Ennis, H. G. Fales, H. J. Fraser, H. J. French, George F. Geiger, Alexander Gobus, John Gwilliam, Henry Hartman, Fred Heinzelman, T. N. Holden, G. J. Horvitz, International Nickel Co. (Sustaining), G. Brinton Jack, Jr., Charles B. Jones, Robert C. Jordan, Noah A. Kahn, Augustus B. Kinzel, V. N. Krivobok, Francis F. Lucas, Andrew E. Merget, Paul D. Merica, Albert W. Merrick, Wm. A. Mudge, Stanley M. Norwood, Peter Payson, William Printz, Walter E. Remmers, John F. Rose, Harry Schagrin, Frank T. Sisco, Jerome Strauss, Russell S. Thompson, Sam Tour, J. S. Vanick, E. H. Webb, R. A. Wheeler, T. H. Wickenden, Evan F. Wilson, G. Wirrer, Edmund A. Wise, I. N. Zavarine, J. H. Zimmerman.

Hand Welding Costs Can Be Reduced

Reported by **F. R. Morral**
Syracuse University

A particularly bright future is forseen for semi-automatic arc welding by Paul W. James, vice-president of San-Equip Inc. This method combines the best points of both submerged-arc and hand welding, he asserted in a talk entitled "Pros and Cons of Arc Welding". Mr. James addressed a joint meeting of the Syracuse Chapters of A.S.M. and the American Welding Society on Nov. 8.

Certain steps are commonly taken by management and engineers in deciding on the desirability of purchasing automatic equipment; trial and error, however, is frequent. In assessing the rather simple factors involved in automatic welding—which are frequently the same with hand welding—the lowest total cost to do a good job should always be kept in mind. Factors discussed for each method are specifications, current densities, welding electrode sizes, speeds, finish of bead, cleanliness of surfaces to be welded, jigging, fit-up, maintenance of equipment, skilled labor, materials, and welding techniques.

The speaker believes—and cited substantiating evidence he has seen—that much of the hand welding being done is not as cheap as it might be. Larger size electrodes and higher current densities than those recommended are possible and perhaps even desirable, welds made under these conditions will meet good engineering requirements.

The final criterion for choice between hand and automatic welding depends on cost, he concluded. In many shops the lowest possible cost for hand welding has not been attained.

Hot Spot Machining Saves Man-Hours

Reported by **Howard E. Boyer**
American Bosch Corp.

"Hot Spot Machining," explained Col. Leslie S. Fletcher before the October meeting of the Springfield Chapter A.S.M., differs from the more conventional hot machining first employed in blacksmith shops many decades ago. He defined it as a machining operation performed on a locally heated portion of the work. Mr. Fletcher, now retired from military service, is technical director for Sam Tour & Co., Inc., where the process was developed.

Hot spot machining is still in its infancy, the speaker pointed out. It is difficult to predict the practical possibilities for the future, although it is well documented at this time that metal can be removed several times as fast at elevated temperatures as at room temperature. Mr. Fletcher emphasized that the greatest advantage can be gained from hot spot machining of hard-to-cut metals such as Inconel-X, S-816 and other high-temperature alloys.

Carbide cutting tools are usually employed for machining hot metal, although high speed steel tools might be satisfactory in some applications. While the optimum temperature of the work depends on numerous factors, the benefits of elevated-temperature cutting begin at about 500° F. and gradually increase as the metal softens so that 1400 to 1600° F. is often an ideal temperature.

In spite of the improvement which can be gained by this method, the savings must be balanced against the cost of induction or flame heating the work. However, heavy expenditures for tooling are often more than justified by the saving in man-hours, Mr. Fletcher concluded.

Case Schedules Conference

Industrialists, educators and representatives of the armed service will consider problems of mutual concern at the Second Industry-College Conference to be held at Case Institute of Technology, Cleveland, on Jan. 20. "The Engineer and National Security" is the theme of the conference. Sponsors of the conference are the Relations with Industry Committee of the American Society for Engineering Education and Case Institute.

A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad, Received During the Past Month

Prepared in the Library of Battelle Memorial Institute, Columbus, Ohio
W. W. Howell, Technical Abstractor
Assisted by Pauline Beinbrech, N. W. Baklanoff, Fred Rothfuss, and Leila M. Virtue

A GENERAL METALLURGICAL

277-A. Industrial Mobilization Plan for the Malleable Iron Castings Industry. *Foundry*, v. 78, Nov. 1950, p. 100, 230, 232-233.

Details of the malleable-iron foundry industry's productive capacity from a report submitted recently to the Munitions Board by The Malleable Iron Castings Subcommittee of the Foundry Industry Advisory Committee. (A6, E general, CI)

278-A. The Castings Industry and the Munitions Board. Earl D. Payne. *Foundry*, v. 78, Nov. 1950, p. 101, 253-259.

Functions of the Munitions Board and its relationship to the castings industry during the present emergency. (A6, E general)

279-A. G. E. Opens Lynn Measurements Laboratory. *Steel*, v. 127, Oct. 30, 1950, p. 59-60.

Meter and Instrument Divisions laboratory for developing new measuring devices, creating new materials, and analyzing and improving designs. (A9)

280-A. How Defense Production Will Affect Materials Supplies. Leon M. Jaroff. *Materials & Methods*, v. 32, Oct. 1950, p. 51-55.

Review of the current materials picture and some conjectures on what we can expect in the event of an all-out war effort. Individual metals and other basic materials are discussed separately. (A4, A6)

281-A. A Close-Up of the Inter-Mountain Area's Metalworking Industry Shows Strength. James Joseph. *Western Metals*, v. 8, Oct. 1950, p. 23-25.

Reports on products, plant facilities, expansions, purchases of machinery and equipment, and future potential of the metalworking industry in above region, based on a series of interviews with plant managers and production executives. (A6)

282-A. Metal Fabrication Potential of Southern California. *Western Metals*, v. 8, Oct. 1950, p. 30-33.

An illustrated survey. Los Angeles area is covered by E. K. Young; and the San Diego area by George C. Clark. (A6)

283-A. Analysis of Ore Residues for Ionium and Protactinium. L. I. Katzin, Q. Van Winkle, and J. Sedley. *Journal of the American Chemical Society*, v. 72, Oct. 1950, p. 4815-4817.

Analysis of some residue fractions which have not previously been considered as sources for protactinium (Pa^{231}) and ionium (Th^{230}), but which may prove to be convenient sources of these materials. On the basis of the results, a number of milligrams of Pa and approximately one-half gram of Th (with three times as much Th^{232}) were obtained in pure state, from a carbonate fraction. Yields of Pa correspond to 50-60% of the material indicated by preliminary analysis. 11 ref. (A8, S11, EG-h)

284-A. Application of Ion Exchange; Copper-Amberlite IR-120 in Fixed Beds. W. A. Selke and Harding Bliss. *Chemical Engineering Progress* (Engineering Section), v. 46, Oct. 1950, p. 509-516; discussion, p. 516.

Experimental work on method for treatment of dilute wastes, such as wash waters from metal pickling or plating operations. 17 ref. (A8)

285-A. Blast-Furnace Slag Cement. J. A. Brothers and M. R. Foran. *Canadian Mining and Metallurgical Bulletin*, v. 43, Oct. 1950, p. 569-579; *Transactions of the Canadian Institute of Mining and Metallurgy*, v. 53, 1950, p. 407-417.

The coding symbols at the end of the abstracts refer to the ASM-SLA Metallurgical Literature Classification. For details write to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

286-A. Destruction of Cyanide in Waste Waters by Chlorination. G. E. Eden, B. L. Hampson, and A. B. Wheatland. *Journal of the Society of Chemical Industry*, v. 69, Aug. 1950, p. 244-249.

A study of the reactions of Na and Ca hypochlorites with buffered alkaline solutions of KCN. A process was developed for treating electroplating wastes or other waste waters containing cyanide, by reaction with Ca hypochlorite at pH 11. The process is applicable to liquids containing simple cyanides and the complex cyanides of Zn, Cd, and Cr, but not to solutions containing Ni. 14 ref. (A8, L17)

287-A. Communications Metallurgy. E. E. Schumacher. *Engineering*, v. 170, Oct. 6, 1950, p. 296. (A condensation.)

Metallurgical research problems at Bell Telephone Laboratories in the U. S. (A9, T1)

288-A. The Status of the Aluminum Industry. *Light Metal Age*, v. 8, Oct. 1950, p. 10, 26.

A report by the Aluminum Association. (A4, Al)

289-A. Sees Need for World Control of Zinc by a Combined Materials Resources Board. R. L. Wilcox. *Metals*, v. 21, Oct. 1950, p. 8-9.

Opinions of Chief, Nonferrous Metals Branch, E.C.A. (A4, Zn)

290-A. U. S. Must Rely Heavily on Scrap Metals To Meet Defense Production Requirements. Charles W. Merrill. *Metals*, v. 21, Oct. 1950, p. 10-11.

Excerpts from address by Chief, Base Metals Branch, Bureau of Mines. (A4)

291-A. Economics of Waste Treatment; With Particular Reference to Acid, Plating, Paper, and Oil Wastes. V. J. Calise. *Water & Sewage Works*, v. 97, Nov. 1950, p. 479-483.

Includes flow and equipment diagrams. (A8)

292-A. Tank Rebuilding Speeded by Fixtures. Rupert Le Grand. *American Machinist*, v. 94, Oct. 30, 1950, p. 108-114.

Miscellaneous procedures at Detroit Arsenal. Flame cutting, welding, machining, drilling, and annealing play important roles. (A5, T2, ST)

293-A. Metallurgical Furnace Stacks. C. A. Bishop. *American Industrial Hygiene Association Quarterly*, v. 11, Mar. 1950, p. 34-39.

The various types of furnaces and the progress which has been made in satisfying the requirements for metallurgical stacks of Smoke Control Ordinance of Allegheny County, Pa. (A7)

294-A. The World's Cheapest Steel. *Fortune*, v. 42, Nov. 1950, p. 82-89, 186, 189-190, 192.

Story of an Australian monopoly—The Broken Hill Proprietary Co., Ltd. (A5, ST)

295-A. The Squeeze on Nickel. *Fortune*, v. 42, Nov. 1950, p. 93-96, 194, 196.

The world nickel situation, with emphasis on the monopolistic character of International Nickel Co. (A4, Ni)

296-A. Economic Utilization of Sulfur Dioxide From Metallurgical Gases. R. A. King. *Industrial and Engineering Chemistry*, v. 42, Nov. 1950, p. 2241-2248.

The peculiar conditions of dispersion of smelter smoke at Trail, B. C.; development of various sulfur-recovery processes; technical and economic considerations involved. At present all roaster and sintering plant gas is treated for sulfur recovery, and iron concentrate is roasted intermittently, depending on demand for acid and availability of Zn concentrates. Total current loss to the atmosphere is less than 9% of the sulfur charged. 12 ref. (A8, B15, C21)

297-A. High Purity Sulfur From Smelter Gases; Reduction With Natural Gas. Edward P. Fleming and T. Cleon Fitt. *Industrial and Engineering Chemistry*, v. 42, Nov. 1950, p. 2249-2253.

Difficulties encountered in operating the coke-reduction process and advantages to be derived by sub-

stitution of natural gas as a reducing agent, when this is available. Development of the methane process over five years of operation of a semicommercial plant at Garfield, Utah. In general, the process consists of high-temperature combustion of approximately 7% SO_2 gas with an automatically controlled volume of natural gas. (A8, C21)

298-A. Liquid Sulfur Dioxide From Waste Smelter Gases; Use of Dimethylaniline as Absorbant. Edward P. Fleming and T. Cleon Fitt. *Industrial and Engineering Chemistry,* v. 42, Nov. 1950, p. 2253-2258.

Reviews the various pilot-plant investigations conducted by American Smelting and Refining Co. during the past 30 years in order to perfect the above process. Processes developed along these lines in Europe and reasons given for selection of anhydrous dimethylaniline as the preferred reagent. Flow diagram of a 20-ton plant installed in the company's lead smelter. Possibilities of application to recovery of SO_2 from low-grade industrial gases by use of other reagents. (A8, C21, Pb)

299-A. Recovery of Sulfur Compounds From Atmospheric Contaminants. Morris Katz and R. J. Cole. *Industrial and Engineering Chemistry,* v. 42, Nov. 1950, p. 2258-2269.

Annual losses of sulfur from products discharged to the atmosphere from Zn plants, Pb, Cu and Ni smelters, crude-oil refineries, and from coal combustion, are compared with world native sulfur production and by-product sulfur recovery. The extent to which sulfur emission must be reduced, to avoid injury to plant life, in terms of permissible levels of ground concentration. Methods for recovery of sulfur compounds from SO_2 and H_2S in stack gas. Additional research needed in some industries, for example Ni smelting. 66 ref. (A8, C21)

300-A. Metalworking Research Reaches All-Time High. W. W. Austin, Jr., and Peyton Wheeler. *Iron Age,* v. 166, Nov. 9, 1950, p. 95-98.

Second article of series surveys research facilities and activities of Southern Research Institute, Birmingham, Ala. Additional facilities are being added for metals, ceramics, and protective coatings. (A9)

301-A. Aluminum Industry Seeks To Meet Mounting U. S. Needs. *Chemical and Engineering News,* v. 28, Nov. 13, 1950, p. 3972-3974.

Present status and future prospects. Considers U. S. deterrents to increased production—shortages of bauxite and of electric power. (A4, Al)

302-A. A Report on Taconite. E. W. Davis. *Engineering and Mining Journal,* v. 151, Nov. 1950, p. 84-85.

A profit of 29c per gross ton of pellets delivered to Lower Lake Ports at the current Lake Erie price is indicated by a recent study. (A4, Fe)

303-A. Dwindling Stocks Spur Manganese Recovery From Slag. Russell C. Buehl. *Steel,* v. 127, Nov. 13, 1950, p. 108, 110, 113.

Surveys Bureau of Mines work on processes for reclaiming Mn from openhearth slags. The main process being studied involves use of an experimental blast furnace to reduce the slag, followed by use of an experimental converter to produce a high-Mn slag. Other work of the Bureau on Mn involves several beneficiation procedures. (A8, B14, Mn)

304-A. Chile Starts Operation of Integrated Steel Mill. *Journal of Metals,* v. 188, Nov. 1950, p. 1316. (A5, ST)

305-A. The Development of a Heat Treating Burden Rate. C. G. Towne and Ray Sault. *Metal Treating,* Sept. 1950, p. 7-8, 17-18.

Factors involved include equipment and installation, floor space and rent, quenching oil, fuel, power and light, maintenance, direct and indirect labor, Social Security, Workmen's Compensation, employee-benefit insurance, and general expenses. (A6, J general)

306-A. Growth of the Aluminum Industry. P. M. Menon and B. Krishnamurthy. *Transactions of the Indian Institute of Metals,* v. 1, Apr. 1949, p. 75-84; discussion, p. 85.

Surveys worldwide developments in technology and applications. Includes statistical data. (A4, Al)

307-A. Aluminium and Aluminium Alloys; Present Consumption and Future Possibilities in India. E. A. Langham. *Transactions of the Indian Institute of Metals,* v. 1, Apr. 1949, p. 297-300. (A4, Al)

308-A. The Future of Aluminium in India. R. D. Palmer. *Transactions of the Indian Institute of Metals,* v. 1, Apr. 1949, p. 301-305; discussion, p. 306-308.

Economic survey and forecast. (A4, Al)

309-A. Important Facts About Our Supplies of Non-Ferrous Metals. C. Donald Dallas. *Automotive Industries,* v. 103, Nov. 15, 1950, p. 52, 96, 98, 100.

Present status and future prospects. Considers mainly Cu, Zn, and Al. Arguments against the U. S. tariff on copper. (A4, Cu, Zn, Al)

310-A. The Current Outlook and Future of Magnesium. J. D. Hanawalt. *Modern Metals,* v. 6, Oct. 1950, p. 51, 54.

A question-and-answer session. (A4, Mg)

311-A. Aluminum Today: Supply Situation Worse; No Relief Expected Before 1952. World Allocation Would Help Ease Pinch. W. B. Griffin. *Modern Metals,* v. 6, Oct. 1950, p. 58, 60.

Economic analysis and forecast. (A4, Al)

312-A. Utilization of Light-Alloy Turnings. (In French.) Jean Duport. *Fonderie,* Aug. 1950, p. 2162-2163.

Methods, optimum conditions and flux compositions. (A8, E10, Al)

313-A. Removing Zinc From Zinc-Plated Iron and Steel Scrap. (In German.) Edmund R. Thews and Martin Stromeyer. *Metalloberfläche,* v. 4, sec. A, Aug. 1950, p. 121-123.

Reasons why zinc should be removed from ferrous scrap. The method of removal should depend on the purpose for which the new metal is to be used. (To be continued.) (A8, Fe, Zn)

314-A. (Book) **British Iron and Steel Federations' Statistical Year Book for 1948. Part II. Overseas Countries.** 432 pages and 13 maps. 1950. British Iron and Steel Federation, Steel House, Tothill St., London S.W.1, England. 15s.

Information relating to Eire, Mexico and Southern Rhodesia is included for the first time, while additional statistics are provided for Austria, Brazil, Canada, Italy, Japan, Saar, Spain, and Sweden. A comprehensive statistical guide to the iron and steel industries of the world. (A4, Fe, ST)

315-A. (Book) **Tin, 1949-50: a Review of the World Tin Industry.** 55 pages. International Tin Study Group, The Hague, Netherlands. 4s.

The main developments in the production and consumption of tin in the year to June 30, 1950. A detailed examination (with statistics) of the position in each of the main producing and consuming countries; summarizes the world tinplate position and prospects. (A4, Sn)

B

RAW MATERIALS AND ORE PREPARATION

311-B. Improved Refractory Now Produced in Volume. *Iron Age,* v. 166, Oct. 26, 1950, p. 60.

Properties of "Allmul", a practically all-mullite refractory, now being produced by Babcock & Wilcox Co. It is principally used in the manufacture of firebrick, but will also be available in the form of grain and as a ramming mix. (B19)

312-B. The Fluosolids Reactor: Cochenour Willians Gold Mine, Ltd. Owen Matthews and Sidney Wright. *Canadian Mining Journal,* v. 71, Oct. 1950, p. 72-74.

Equipment by which an arsenopyrite gold-bearing concentrate is prepared for cyanidation. The reactor has demonstrated its ability to convert a concentrate containing arsenopyrite, pyrite, stibnite, and gangue from which gold could not be extracted economically, into one from which it can be recovered economically by means of standard cyanidation methods and equipment. (B14, Au)

313-B. Industrial Refractories. J. Lomas. *Machinery Lloyd* (Overseas Edition), v. 22, Sept. 30, 1950, p. 85-87, 89, 91.

Types and applications. (B19)

314-B. Fuel Oil in the Steel Industry in the U. S. A. A. J. Fisher. *Institute of Fuel and Institute of Petroleum,* "Modern Applications of Liquid Fuels", 1950, p. 64-95; discussion, p. 95-115.

Data on fuel reserves, production, and consumption. Use of fuel oil in coke ovens, blast furnaces, openhearth furnaces, boilers, soaking pits, forge furnaces, heat-treating furnaces, etc. (B10, D general, F21, J general, ST)

315-B. The Use of Fuel Oil in Furnaces for the Iron and Steel Fabricating Industries. M. Roddan. *Institute of Fuel and Institute of Petroleum,* "Modern Applications of Liquid Fuels", 1950, p. 116-149.

Efficiency of combustion and heat application. Various types of burners and furnaces used with fuel oils. (B18, ST)

316-B. Central Eureka Cuts Gold Loss by Feeding Reagent at New Location. *Mining World,* v. 12, Nov. 1950, p. 13.

Simple change which resulted in 25% reduction in gold loss. Using one of the flotation reagents to act as a dispersing agent in the jig circuit, in addition to its flotation role, has made the improvement possible. (B14, Au)

317-B. Iron Ore Flotation at Canisteo. *Mining World,* v. 12, Nov. 1950, p. 28-32.

Pilot-plant work of Minerals Separation North American Corp., which proves that starch, lime, and soap are satisfactory reagents for low-cost flotation of iron minerals. Results for the 1948 and 1949 operating seasons. Cost estimates and an economic analysis. (B14, Fe)

318-B. Processing Uranium Ores. F. W. McQuiston, Jr. *Mining Congress Journal,* v. 36, Oct. 1950, p. 28-30.

Hydrometallurgical methods used to treat domestic materials. (B13, U)

319-B. Investigation of New Special Deoxidizers. C. G. Mickelson. *Journal*

of Metals, v. 188, Nov. 1950, p. 1311-1311C.

Experimental work on use of a series of deoxidizers for cast steel including: Al; Na; Al+Se; Al+Graphidox (6% Ca, 50% Si, 10% Ti); Al+Ca-Mn-Si alloy; and a Si-Mg-Al alloy. (B22, CI)

320-B. Slag Materials and Action in Basic Arc Furnaces. C. B. Post and D. G. Schoffstall. *Journal of Metals,* v. 188, Nov. 1950, p. 1313-1315.

Properties and choice of materials. (B21, D5, ST)

321-B. Modernizing New Jersey Zinc's Eagle Mill. Part I. J. G. Craig. *Engineering and Mining Journal,* v. 151, Oct. 1950, p. 80-85; Nov. 1950, p. 101-105.

Improvement program includes rod-mill crushing, soluble-salt removal, new equipment installation, revised flowsheet, and automatic controls. Lead and zinc are recovered in above mill, which is largely underground, near Gilman, Colo. Flowsheet. (B13, B14, Pb, Zn)

322-B. Engineering Features in Northern Rhodesian Base Metal Mining. *Mining Journal,* v. 235, Oct. 27, 1950, p. 391-394.

Equipment and procedures for size reduction, beneficiation, smelting, and refining of Cu, Zn, and Pb. (B13, B14, C21, Cu, Zn, Pb)

323-B. Refractories—Their Manufacture and Use. A. H. Thomson. *Canadian Metals,* v. 13, Oct. 1950, p. 14-16, 43.

Raw materials used, manufacturing processes, and basic and specialized uses. (B19)

324-B. Production of Aluminium From Indian Bauxite. Sumeru Chandra Jain and P. D. Pant. *Transactions of the Indian Institute of Metals,* v. 1, Apr. 1949, p. 87-131; discussion, p. 131-133.

Raw material, process, and equipment. Numerous flow diagrams. (B10, C23, Al)

325-B. A Note on the Extraction of Copper at the Moubhandar Works of the Indian Copper Corporation Ltd. J. G. Berry. *Transactions of the Indian Institute of Metals,* v. 3, 1949, p. 333-345.

Equipment and procedures for ore beneficiation and smelting. (B14, C21, Cu)

326-B. The Production of Rammed Masses of Dolomite With High Packing Density. (In German.) Gerhard Tromel. *Stahl und Eisen,* v. 70, Sept. 28, 1950, p. 883-887.

Recommendations for increasing the life of dolomite linings for open-hearth and electric furnaces by proper grain-size selection. Reactions between the lining and the metal-slag bath were observed and it was found that the rapidly oxidizing steel retained in the lining plays an important part in the life of the hearth as well as in the refining of the next melt. Use of dolomite for repairing furnaces, lining converters, and producing dolomite bricks. 27 ref. (B19, D2, D5)

327-B. Removal of Arsenic From Lead Concentrates by Roasting the Powder With Pyrite. (In German.) Franz Brenthel. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 3, Sept. 1950, p. 290-296.

Experiments with different types of concentrate. Those containing up to 2% As require at least 10% pyrite to vaporize the As in the range 450-700° C. Use of an inert-gas atmosphere is recommended. (B15, Pb)

328-B. Crushing Practice and Theory. Part II. Definitions Used in Crusher Operation. Part III. Operating Characteristics of Various Types of Crushers. Part IV. Gyratory Crusher Concaves. Brownell McGrew. *Rock Products,* v. 52, Sept. 1950, p. 95; Oct. 1950, p. 116-117, 131; Nov. 1950, p. 62-63.

(To be continued.) (B13)

329-B. Sintering of Powdered Magnetite. (In Italian.) Giovanni Gianasso. *Metallurgia Italiana,* v. 42, July 1950, p. 268-272.

Results of laboratory tests show that in sintering of magnetite ores, it is possible to obtain a solid, but porous and very reactive product, by heating at 900-1100° C. in an oxidizing atmosphere. This makes it possible to modify sintering conditions of the Gröndal process obtaining, at the same time, a reduction of cost and improvement of the product. Pilot-plant results starting from very fine and highly enriched powdered ores show that it is possible to obtain superior results. (B16, Fe)

330-B. Apparatus for Beneficiation of Ores by a "Flotation-Granulation" Process. (In Russian.) I. N. Plaksin and I. I. Kurenkov. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Aug. 1950, p. 1189-1197.

Method and apparatus for beneficiation of varied ores based on a combination of gravitation and flotation. Admission of atomized air together with a jet of water and installation of air barriers are recommended for intensification of the process on the concentration table. Other modifications for improving the process. (B14)

331-B. (Book) Canadian Mines Handbook 1950. Part I. Principal Companies. Part II. Supplementary List, Including Inactive and Extinct Companies. 350 pages. 1950. Northern Miner Press Ltd., Toronto, Ont., Canada.

(B12, A10)

332-B. (Book) Raw Materials of the Iron and Steel Industry. A. K. Osborne. *Purchasing Officers' Association* (Wardrobe Chambers, 146 Queen Victoria St., London E.C. 4, England), 1950, 31 pages. 3s.

Approach is from an economic aspect. Sources, availability and consumption of various materials, together with a brief outline of their uses and the methods by which they are produced. Coal and refractories are not included. (B10, A4)

C
NONFERROUS EXTRACTION AND REFINING

153-C. Fuel Factors in Non-Ferrous Fabrication. Leslie Aitchison. *Institute of Fuel and Institute of Petroleum,* "Modern Applications of Liquid Fuels", 1950, p. 150-158; discussion, p. 158-176.

Factors affecting the choice of fuel for refining Cu and for melting and annealing Al, Cu, and Mg alloys. (C21, J23, Al, Cu, Mg)

154-C. Graphite-Rod Hairpin-Resistor Radiation Furnace for High Temperatures. W. J. Kroll, W. W. Stephens, and J. P. Walsted. *Journal of Metals,* v. 188, Nov. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1394-1395.

Furnace found to be well adapted for producing zirconium carbide from oxide at temperatures between 1800 and 2000° C. with 100% recovery of Zr content. It is believed that the furnace may be suitable for producing other high-melting carbides or borides. Performance data. (C21, C-n, Zr)

155-C. Production of Titanium From $TiCl_4$ in an Arc Furnace. L. D. Jaffe and R. K. Pitler. *Journal of Metals,* v. 188, Nov. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1396.

The furnace and results of preliminary investigation of the process. (C21, Ti)

156-C. Design and Control of Ferro-Alloy Furnaces. F. V. Andreae. *Transactions of the American Institute of Electrical Engineers,* v. 69, 1950, p. 557-562.

Previously abstracted from condensed version in *Electrical Engineering.* See item 67-C, 1950. (C21, Fe-n)

157-C. Operation of Pilot Plant for Reducing Zinc Concentrates With Methane Gas. R. D. Van Zante and C. H. Gorski. *U. S. Bureau of Mines,* Report of Investigations 4730, Oct. 1950, 13 pages.

Design and operation. A zinc-smelting run. Includes photograph of plant, diagram of smelting unit, and the gas-flow diagram. 13 ref. (C21, Zn)

158-C. Research on the Thermal Reduction of Magnesium Oxide. (In German.) Armin Schneider. *Zeitschrift für Metallkunde,* v. 41, July 1950, p. 205-212.

Methods for determining equilibria in the process, using as reducing agents ferrosilicon, calcium carbide, and Ca-Si alloys. Comparative measurements of reaction rates and factors affecting them. 26 ref. (C21, Mg)

159-C. Study by Electron Diffraction of Certain Reactions and Surface Structures of Metals; The Method of Vacuum Casting. (Concluded.) Robert Courtel. *Métaux et Corrosion,* v. 25, July-Aug. 1950, p. 188-199.

Surface reactions during casting in a controlled atmosphere. General characteristics of oxidation reactions during casting for the cases of Fe, Al, and Mg. Evidence for an "oxidation threshold", using an 80-20 Ni-Cr alloy as an example. A second method for determination of temperature attained during casting. An application of vacuum casting to the problem of oxidation of rare-earth metals. Evidence of the existence of the "C" form of Ce_2O_3 and data on its lattice constants. (C25, M21, R2)

160-C. Reduction of Pyrolusite Ore by Pyrite, Coke, Sulfur Dioxide, or Ferrous Sulfate. (In Polish.) M. Perec and K. Pinkas. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 2, no. 3, 1950, p. 187-195.

Difficulties involved in use of pyrite, coke, or SO_2 for this reduction. Advantages of use of hydrated ferrous sulfate (available from waste pickling solutions). Conditions necessary for quantitative reduction of MnO_2 to $MnSO_4$ were established. Difficulties connected with separation of $Fe(OH)_3$ were eliminated. A complete scheme for production of electrolytic Mn is proposed including reduction of ore, purification of solution, and regeneration of NH_3. 10 ref. (C23, A8, Mn)

D
FERROUS REDUCTION AND REFINING

290-D. 550-Ton Open Hearth Shows Operating Economies. W. W. Kompart. *Steel,* v. 127, Oct. 23, 1950, p. 78, 80.

Basic brick construction of Weirton's king-size furnace cuts rebuilding costs about 25% per ton of steel produced. Use of oxygen also reduces tap-to-tap time. (D2, ST)

291-D. The Midland Works of Crucible Steel Co. of America. T. J. Ess. *Iron and Steel Engineer*, v. 27, Oct. 1950, p. M1-M19.

Plant operations from raw materials, through coke plant, blast furnace, steelmaking, blooming mills, bar and merchant mills, strip mill, heat treat and cold draw, and production of agricultural shapes. (D general, F general, ST)

292-D. Technical Aspects of Northern and Southern Blast Furnace Practice. C. G. Hogberg. *Iron and Steel Engineer*, v. 27, Oct. 1950, p. 37-47; discussion, p. 47-54.

Compares practice of blast furnaces employing widely different slag-volume relationships. This comparison is made possible by the inherent major difference in iron ores mined for consumption in the Birmingham district as compared with ores from the Lake Superior district. Includes extensive tabular data on furnace dimensions, composition of raw materials, operating data, and results. 11 ref. (D1, Fe)

293-D. Properties of Available Blast Furnace Refractories. M. A. Fay. *Iron and Steel Engineer*, v. 27, Oct. 1950, p. 55-59. (D1)

294-D. A Mineralogical Study of the Corrosion of Checker Bricks From Open-Hearth Steel Furnaces. Liang-Ho Su. *Transactions of the British Ceramic Society*, v. 49, Oct. 1950, p. 420-453.

Corroded bricks from the regenerators of two openhearth furnaces were studied. The phases present in the corrosion products were identified by microscopic and X-ray methods. Six complete quantitative chemical analyses were carried out. Development of the corrosion process. 78 ref. (D2, ST)

295-D. Oil-Fired Open-Hearth Furnaces: A Review of British Practice. T. C. Bailey. *Institute of Fuel and Institute of Petroleum*, "Modern Applications of Liquid Fuels", 1950, p. 13-25.

Delivery of oil to the furnace; burners; air supply; oil consumption; quality of steel; and instrumentation. (D2, ST)

296-D. The Open-Hearth Furnace: A Comparison of Oil and Producer Gas Firing. Iain M. D. Halliday. *Institute of Fuel and Institute of Petroleum*, "Modern Applications of Liquid Fuels", 1950, p. 26-63.

Compares data for two 80-ton venturi-type furnaces. (D2, ST)

297-D. Blast Furnace Cooling. (In French.) E. Blanc. *Revue de Métallurgie*, v. 47, Aug. 1950, p. 561-567.

Two problems exist: cooling in order to increase furnace life; and excess fuel necessary to counteract the effect of cooling on the smelting process. Different solutions proposed and accepted by industry are analyzed. (D1, Fe)

298-D. Refining With Oxygen in the Openhearth Furnace. (In French.) L. Bernard and R. Ferry. *Revue de Métallurgie*, v. 47, Aug. 1950, p. 573-581; discussion, p. 581.

Experiences of Creusot in France. (D2, B22, ST)

299-D. The Electric Furnace in Production for Fifty Years. James A. Clark. *Blast Furnace and Steel Plant*, v. 38, Oct. 1950, p. 1163-1165.

Development of modern electric arc furnaces for steel production. (D5, ST)

300-D. Open Hearth Furnaces. A. H. Leckie. *Blast Furnace and Steel Plant*, v. 38, Oct. 1950, p. 1166-1173.

See abstract of "Recent Developments in Open-Hearth Furnace Design and Operation", *Engineering*, item 10-D, 1950. (D2, ST)

301-D. Stainless by Induction Melting. R. J. Wilcox. *Journal of Metals*, v. 188, Nov. 1950, p. 1311D-1312.

Experiences of Michigan Steel Castings Co., Detroit. (D6, SS)

302-D. Developments in Blast Furnace Efficiency. (In English.) T. P. Colclough. "International Gieterij Congres 1949—Amsterdam", p. 14-29; discussion, p. 29-30.

Efficiency of fuel consumption. Conditions in the furnace, causes of low efficiency, and methods of eliminating or reducing them. (D1)

303-D. Experimental Investigation of Regulating and Preheating Air in a Blast Furnace 900 Mm. in Diameter. (In French.) P. G. Maceraudi. "International Gieterij Congres 1949—Amsterdam", p. 133-140; discussion, p. 140-141.

Compares results with and without air regulation. Results of preheating air to about 150° C. indicate that the cost of preheating is justified. (D1, Fe)

304-D. Electric Smelting of Indian Iron Ores. Herman Christiansen. *Transactions of the Indian Institute of Metals*, v. 1, Apr. 1949, p. 45-52.

Equipment and procedures. (D8, Fe)

305-D. Operation and Construction of Blast Furnaces Used for Smelting of Crude Fine Ores. (In German.) Ernst Nowak. *Stahl und Eisen*, v. 70, Sept. 14, 1950, p. 829-836.

Design and operation of the furnaces. Recommendations for optimum results. (D1, Fe)

306-D. Evaluation of Refractories for Roofs of Openhearth Furnaces by Measurement of Roof Temperatures. (In German.) Karl Georg Speith and Günther Engels. *Stahl und Eisen*, v. 70, Sept. 28, 1950, p. 861-867.

Customary test methods are critically examined and ways to improve them are proposed. Value of measurement and recording of roof temperatures as an aid in evaluation of refractories, as well as for control purposes. (D2, S16, ST)

307-D. Variation in the Life of Openhearth Furnace Roofs During the Years 1937 to 1949. (In German.) Wilhelm Baumgardt. *Stahl und Eisen*, v. 70, Sept. 28, 1950, p. 867-869.

Data show that in Germany the lives of furnace roofs consistently decreased in the period of 1940-42 as a result of the difficulty of obtaining suitable materials. This trend was reversed after 1946. A new plan for heating up new silica roofs to prevent their being damaged from too rapid expansion. (D2, ST)

308-D. Examples of Deterioration of Silica Crown Refractories of Openhearth Furnaces Having Similar Appearances, But Different Causes. (In German.) Rudolf Frerich. *Stahl und Eisen*, v. 70, Sept. 28, 1950, p. 870-873; discussion, p. 873-877.

Three examples are illustrated. Recommended procedure for joining silica brick, involving use of silica mortar. (D2, ST)

309-D. Evaluation of Openhearth Furnace Data for an Entire Furnace Campaign. (In German.) **Part I. Furnaces of 65 and 80 Tons Capacity.** Wilhelm Baumgardt and Karl Speith. **Part II. Furnaces of 100 and 150 Tons Capacity.** Georg Henks and Wolfgang Schleicher. *Stahl und Eisen*, v. 70, Sept. 28, 1950, p. 877-883.

Collected data on melting conditions, metallurgical reactions, output rate, fuel consumption, etc. (D2, ST)

310-D. New Flexible Roof Construction Cuts Furnace Maintenance Cost. *Steel*, v. 127, Nov. 20, 1950, p. 116, 118.

New double-hung "pendulum action" insulated refractory arch. Besides reducing the required number of refractory shapes, the roof is sufficiently flexible to be attached to an existing steel framework, regardless of its warped or twisted condition. The double-hung arch is designed particularly for steel-mill furnace roofs. (D general, F21, ST)

311-D. A-1 Steel From Low Grade Coke. *Steel*, v. 127, Nov. 20, 1950, p. 121-122. Based on talk by James R. Killian, Jr.

Research on the fundamental chemistry of sulfur in steelmaking. Results gave assurance that brittleness arising from sulfur in steel can be controlled. Studies were made in small electrically heated furnaces. Nearly 500 tests were made on slag-metal reactions. (D general, ST)

312-D. Iron Smelting Problems. Earle C. Smith. *Metal Progress*, v. 58, Nov. 1950, p. 721-724.

Excerpts from the Campbell Memorial Lecture. Technical and economic problems of blast-furnace operation; several possible methods for improvement. Believes that, in spite of technical inefficiency, the blast furnace will continue to be preeminent because of its superior economic performance. (To be published in full in *Transactions of the American Society for Metals.)* (D1, Fe)

313-D. Steel Ladle Refractories. Part I. F. I. Cordwell. *Refractories Journal*, v. 26, Oct. 1950, p. 415-424. Based on paper by E. Rousseau, *Chemie et Industrie*, v. 62, nos. 3-4.

Review of recent technical progress. Development of an immersion test for evaluation of ladle refractories before placing in service. Destructive agencies acting on steelmaking-ladle linings, erosion and corrosion phenomena and their significance during ladle filling and teeming, pyroscopic resistance of the glaze, and adverse consequences of destruction of the ladle lining. Test procedure and results for a series of ladle refractories. (D9, ST)

314-D. Oxygen-Enriched Blast in the Basic Bessemer Converter. (In French.) P. Coheur, L. Marbais, and A. Grosjean. *Revue de Métallurgie*, v. 47, Sept. 1950, p. 693-698; discussion, p. 698-699.

A series of Belgian experiments performed in three different steel mills. Data indicate that the quality of the steel thus produced is nearly as good as that produced by the open-hearth process. (D3, ST)

315-D. Revival of the Acid Bessemer Process. (In Swedish.) Wilhelm Ekman. *Jernkontorets Annaler*, v. 134, no. 7, 1950, p. 301-333; discussion, p. 333-342.

Behavior of nitrogen in the acid bessemer process on the basis of investigations and experiments at Swedish works. The final nitrogen content is assumed to be the result of two simultaneous but opposing processes. On the one hand, nitrogen is taken up from the blast; on the other, nitrogen is given off when iron oxidized by the blast is reduced by the carbon in the bath. The resulting nitrogen content depends upon which of these factors predominates. A patented method for obtaining a low N content by means of ore additions and inclined blowing. New methods of dephosphorizing and desulfurizing coke pig iron make it possible to use such iron as a raw material. 14 ref. (D3, ST)

316-D. Swedish Blast Furnaces. (In Swedish.) C. G. Cedervall. *Jernkontorets Annaler*, v. 134, no. 8, 1950, p. 343-452; discussion, p. 453-460.

Detailed information on design and operation. The development in Sweden since 1913 based on an ear-

lier similar compilation of data. Comparison between Swedish and foreign coke-fired blast furnaces. The refining of pig iron for quality steel production. Numerous tables and 20 full-page blast-furnace diagrams. 11 ref. (D1, Fe)

317-D. (Book) **Elektrostahl-Erzengung.** (Electric-Furnace Steel Production). Franz Sommer and Hans Pollock. 338 pages. 1950. Stahleisen m.b.H., Dusseldorf, Germany. 34 DM.

Electrotechnical fundamentals; refractory materials; construction of electric furnaces; working and metallurgical operation during melting and alloying; and the economics of electric steel production. Achievements of the American electric steel industry are specially emphasized. About 200 ref. (D5, ST)

E

FOUNDRY

498-E. Special Investment Casting Techniques. K. J. Yonker and G. A. Stolze. *American Foundryman,* v. 18, Oct. 1950, p. 33-36.

Specific examples of complex pieces which required unusual foundry setups (precoating, gating systems, pattern waxes, investment composition, firing schedules, etc.). (E15)

499-E. Producing Malleable Cast Iron; Basic Metallurgy and Operation Mechanisms. Leo R. Friedman. *American Foundryman,* v. 18, Oct. 1950, p. 39-41.

Effects of melting practice on annealing and physical properties, graphitization and other transformations, use of graphitizing elements, etc. (E10, N8, CI)

500-E. Modern Foundry Methods. Plastic Patternmaking for the Small Pattern Shop. E. J. McAfee. *American Foundryman,* v. 18, Oct. 1950, p. 42-45.

Procedures developed for producing phenolic resin patterns in metal-faced molds, at Puget Sound Naval Shipyard. (E17)

501-E. Nodular Iron Symposium Shows We Still Have Long Way To Go. Herbert F. Scobie. *American Foundryman,* v. 18, Oct. 1950, p. 46-48.

Summarizes proceedings of symposium held at Swampscott, Mass., Sept. 12-13, 1950. (E25, CI)

502-E. Foundry Practices for Aluminum Alloys. G. H. Bradshaw. *American Foundryman,* v. 18, Oct. 1950, p. 63.

Briefly summarized. (E general, Al)

503-E. Slagging Practice—A Means of Cupola Control. Thomas F. Hart. *American Foundryman,* v. 18, Oct. 1950, p. 64-66. Reprinted from *Australian Foundry Trade Journal,* May 1950.

Formation of slag in the cupola, which is often considered a necessary evil, is actually of great value for control purposes. Recommended slagging practice. (E10, CI)

504-E. Small Parts Fast—With Automatic Die Casting. *Modern Industry,* v. 20, Oct. 15, 1950, p. 40-41.

Production of die castings at rates of 35-350 per min. at Gries Reproducer Corp., New York City. Latest refinement is an "Intercasting" technique which produces parts with movable elements—unbroken chains and working scissors—in a single operation. (E13, Zn)

505-E. Casting Design for Economical Molding. Clarence T. Marek. *Foundry,* v. 78, Nov. 1950, p. 88-93, 248-252.

A chapter from the book, "Fundamentals in the Production and Design of Castings". See item 286-E, 1950. (E19)

506-E. Nodular Iron Experiments. E. M. Stein. *Foundry,* v. 78, Nov. 1950, p. 96-99, 214, 216-218, 220.

Experiments of Gunite Foundries Corp., Rockford, Ill. The following nodulizing alloys were used: 80-20 Ni-Mg, 50-50 Ni-Mg, 80-20 Cu-Mg, 70-30 Cu-Mg, 34-7 Si-Mg, (balance mainly Fe), and 43-9 Si-Mg (balance mainly Fe). The first one gave results far superior in consistency to the others used. (E25, CI)

507-E. Large Sculpture Group Cast in Aluminum. Joseph Morris. *Foundry,* v. 78, Nov. 1950, p. 102-105, 226-228.

Procedures and equipment used in production of "Venus and Manhattan", which decorates the face of the new Parke-Bernet Galleries Building, New York. The lost-wax process was used. (E15, Al)

508-E. A New Type of Cupola. Robert Doat. *Foundry,* v. 78, Nov. 1950, p. 172, 174-176.

See abstract of "The Metallurgical Blast Cupola", *Foundry Trade Journal,* item 446-E, 1950. (E10, CI)

509-E. Improved Molding Sand Effected by New Conditioner. *Foundry,* v. 78, Nov. 1950, p. 176.

Procedure of Zenith Foundry Co., West Allis, Wis. The sand is reconditioned daily by use of a "Sandmaster" unit. (E18)

510-E. J. I. Case Co. Modernizes Coremaking Facilities. *Foundry,* v. 78, Nov. 1950, p. 212, 214. (E21)

511-E. The Croning Process: A Fast Foundry Method for Making Molds and Cores. *Modern Metals,* v. 6, Oct. 1950, p. 22-24. (E18)

512-E. The Manufacture and Utilisation of Cast Iron Gas Mains. W. Boden. *Gas Times,* v. 64, Sept. 22, 1950, p. 419-421; v. 65, Oct. 6, 1950, p. 43-44. (E11, T4, CI)

513-E. Rationalisation of Sand Preparation. J. F. Goffart. *Foundry Trade Journal,* v. 89, Oct. 12, 1950, p. 319-326.

Previously abstracted from *Institute of British Foundrymen,* Paper No. 975, 1950. See item 347-E, 1950. (E18)

514-E. Foundry Practice. (In Czech.) Jiri Sequens. *Hutnické Listy,* v. 5, July 1950, p. 286-290.

Effects of temperature, pressure, etc., on quality of castings. Recommendations for determining when to use vacuum furnaces, and for selection of protective atmospheres, addition agents, desulfurizers, deoxidizers, fluxes, etc. (E general)

515-E. Gating Systems. (In Czech.) Vaclav Oliverius. *Hutnické Listy,* v. 5, Aug. 1950, p. 321-325.

Design recommendations. (E22)

516-E. Diecast Magnesium Replaces Wood Chair Parts. A. J. Herek. *Iron Age,* v. 166, Nov. 2, 1950, p. 96-97.

Five magnesium die castings form frame of a new folding chair. Unusually long cores are used in casting the legs. Equipment and finished product. (E13, T10, Mg)

517-E. Effect of Rate of Freezing on Degree of Segregation in Alloys. William T. Olsen, Jr., and Ralph Hultgren. *Journal of Metals,* v. 188, Nov. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1323.

Shows experimentally that segregation can be completely suppressed by rapid rates of cooling. For the alloys studied, however, these rates are too great to be attained in commercial practice. An alloy of 55 atomic % Cu, 45 atomic % Ni was frozen by cooling at varying rates. Degree of segregation was determined by X-ray diffraction photographs. The experiments were repeated with an alloy of 16.5% Cu and 83.5% Au. A single experiment also showed a 50 atomic % Bi-Sb alloy had no segregation at the most rapid quench. (E25, N12)

518-E. A Comparison of Commercial Die Casting Machines. W. J. During. *Die Castings,* v. 8, Oct. 1950, p. 40-42, 80; Nov. 1950, p. 31-32, 71.

Advantages and disadvantages of various types of construction. Dimensional features of machines made by various companies for casting Zn and Al are shown in tabular form. (E13, Al, Zn)

519-E. Construction and Use of a 10-Ton Permanent Mold. J. C. Beattie. *Tool & Die Journal,* v. 16, Nov. 1950, p. 46-48.

Believed to be one of the largest permanent molds ever produced for use in pouring Al castings. The mold is made of "GA" Meehanite metal. It is used to make castings approximately 65 in. high and 46 in. diam. (E12, T5, Al, CI)

520-E. Duplicator Parts Precision Cast To Cut Costs. *Iron Age,* v. 166, Nov. 9, 1950, p. 102.

Substitution of precision investment casting for machining of drumlock and clutch-stop pawls for the Ditto D-44 Direct Process Duplicator. (E15)

521-E. Centrifugal Casting for Critical Components. Herbert Cooper. *Machine Design,* v. 22, Nov. 1950, p. 131-132.

Recent developments in techniques for casting stainless steel centrifugally in permanent metal molds have opened new avenues for design engineers. The process is suitable for applications such as pump liners, seat rings, and other critical cylindrical components. (E14, SS)

522-E. Centrifugal Casting in Permanent Molds. Warden F. Wilson. *Product Engineering,* v. 21, Nov. 1950, p. 112-116.

The process, its advantages, design factors, and applications. Tables give physical properties of centrifugally cast heat resistant steels and compositions, specifications, and applications of alloy and carbon steels suitable for centrifugal casting in permanent molds. (E14, CI, SG-h)

523-E. The Melting of Brass and Bronze. James G. Dick. *Canadian Metals,* v. 13, Oct. 1950, p. 22, 24, 26, 28-29, 43.

Directs attention to several current practices that must be avoided if high-quality melts are to be obtained. (E10, Cu)

524-E. Modern Methods of Melting Metals. *Machinery Lloyd* (Overseas Edition), v. 22, Oct. 14, 1950, p. 93-95, 97.

Equipment. (E10)

525-E. Cast Camshafts. *Automobile Engineer,* v. 40, Sept.-Oct. 1950, p. 345-347.

Development and application of "Monikrom" high-duty cast iron. Composition is 3.10-3.40% C, 2.00-2.40% Si, 0.50-0.080% Mn, 0.15-0.25% Ni, 0.80-1.00% Cr, and 0.15-0.25% Mo. Mechanical and service properties, design principles, and special casting technique. (E11, Q general, CI)

526-E. Review of the South African Foundry Industry. H. G. Goyns. *Foundry Trade Journal,* v. 89, Oct. 26, 1950, p. 333-341. (E general)

527-E. Melting and Founding Practice for Aluminium Sand Casting Alloys. P. N. Gandhi. *Transactions of the Indian Institute of Metals,* v. 1, Apr. 1949, p. 163-173; discussion, p. 171.

Includes table of Al casting-alloy specifications. (E11, S22, Al)

528-E. Ferrous Melting Furnaces in the United States and Canada. (In English.) A. W. Gregg. "International

Gieterij Congres 1949—Amsterdam", p. 31-53; discussion, p. 53-54.

Melting furnaces and auxiliary equipment for gray-iron foundries. Also those of steel and malleable foundries. Influence of technical societies on progress. Development of control and testing equipment. (E10, CI)

529-E. Foundry Melting Furnaces for Copper and Nickel Base Alloys. (In English.) F. C. Evans. "International Gieterij Congres 1949—Amsterdam", p. 65-76. discussion, p. 76-78.

The types of furnaces used, their advantages and disadvantages as related to metallurgical considerations, economic considerations, practical and local considerations, and personnel and welfare. 17 ref. (E10, Cu, Ni)

530-E. Some Metallurgical and Practical Aspects on the Melting of Copper Alloys. (In English.) A. Swagerman and Ir. H. Leutscher. "International Gieterij Congres 1949—Amsterdam", p. 89-100; discussion, p. 100-101.

Influence of gases on molten metal and causes of gas bubbles. Effect of melting method, melting furnace, quality of water in molding sand. Compares crucible, reverberatory, low-frequency, and indirect arc furnaces with respect to melting cost per ton, gas absorption, cost of capital investment, refining possibilities, and melting time. (E10, Cu)

531-E. Some Results of Belgian Research on Nodular Cast Iron. (In French.) Albert L. De Sy. "International Gieterij Congres 1949—Amsterdam", p. 118-131; discussion, p. 131-132.

See abstract of "Further Results of Belgian Nodular Cast Iron Research", *American Foundryman*, item 256-E, 1950. (E25, CI)

532-E. A Special Die-Casting Method. (In English.) E. M. H. Lips. "International Gieterij Congres 1949 — Amsterdam", p. 142-145; discussion, p. 145-146.

Previously abstracted from *Foundry Trade Journal*. See item 14C-93, 1949. (E13)

533-E. The Temperature of Liquid Steel in Relation to Fluidity and Sand Burning-on for Steel Castings. (In English.) A. J. Zuithoff. "International Gieterij Congres 1949—Amsterdam", p. 184-195; discussion, p. 195-197.

Factors affecting fluidity and methods of measurement. Usefulness of the latter in practice. The burned-on condition. Recent theories and experiments. 26 ref. (E25, CI)

534-E. Standardisation of Moulding Sand Testing and the Water Absorption Power Included. (In English.) M. Stap. "International Gieterij Congres 1949—Amsterdam", p. 200-215; discussion, p. 216-218.

The best-known methods for sand testing and their underlying principles. Suggestions for standardization. 17 ref. (E18)

535-E. Contribution to the Study of Preparation of Molding Sands. (In French.) L. J. Petrzela. "International Gieterij Congres 1949—Amsterdam", p. 219-233.

Methods of sand moistening and sand sifting were investigated. Devices for preparing synthetic sand with a bentonite bonding agent and for aging the prepared molds. Influence of raw material, variation of humidity, composition, aging, etc. 19 ref. (E18)

536-E. The Manufacture of Ingot Moulds in Cement-sand. (In English.) J. G. P. Bruschke. "International Gieterij Congres 1949—Amsterdam", p. 234-241; discussion, p. 241. (E11, T5)

537-E. The Manufacture of Metal Patterns and Core-boxes Without Machining by the Clay-Plaster Method. (In English.) J. Van Yperen. "International Gieterij Congres 1949—Amsterdam", p. 242-252; discussion, p. 252.

Method used by the N. V. Werkspoor engineering works, Utrecht, Holland, in mechanized molding and coremaking and for constructing bigger patterns and coreboxes. (E17, E21)

538-E. Car Engine Piston Rings Cast Centrifugally in Form of Sleeves. (In English.) P. Januszewicz. "International Gieterij Congres 1949—Amsterdam", p. 270-276; discussion, p. 276-277.

Difficulties in obtaining proper structure, particularly graphite of proper size and form. Method using centrifugal permanent molds coated with 10 mm. of molding sand which produces fine, uniformly distributed lamellar graphite. (E14, CI)

539-E. Non-Destructive Testing of Castings. (In English.) L. Van Ouwerkerk. "International Gieterij Congres 1949—Amsterdam", p. 288-298; discussion, p. 299-300.

Use of X-ray, sonic, magnetic and electrical methods. 25 ref. (E13)

540-E. Studies on Foundry Practice for Nonferrous Castings. I. The Relation Between Casting Weight, Gate Area, and Casting Speed. (In Japanese.) Tomoichi Nakata. *Journal of the Casting Institute of Japan*, v. 22, no. 7, 1950, p. 1-15.

These relations were studied for more than 100 Cu and Al alloy castings. The relation between gate area, casting speed, and casting weight can be roughly represented by a logarithmic curve. Proper casting speed and gate area may be calculated from casting weight. (E22, E23, Al, Cu)

541-E. Metal Penetration Into Castings. X. Penetration Into Copper Alloy Castings. (In Japanese.) Jiro Kashima. *Journal of the Casting Institute of Japan*, v. 22, no. 7, 1950, p. 15-21.

Experiments indicate that for Cu alloys which form CuO films on their surfaces, the presence of moisture in the mold increases the amount of CuO, and eventually the degree of penetration. (E19, Cu)

542-E. Notes on the Manufacture of a Cast Iron Electrical Grid. (In Japanese.) Seiichiro Fukuda. *Journal of the Casting Institute of Japan*, v. 22, no. 7, 1950, p. 21-24.

Recommended procedures. (E19, CI)

543-E. Hydrogen and the Refining of Silumin. (In German.) Walter Mannchen. *Metall*, v. 4, Sept. 1950, p. 377-379.

Briefly reviews the literature dealing with the refining of silumin (Al-Si alloy) by additions of Na. Presents a new explanation of the refining effect of Na, showing that the H_2 released from the cooling melt acts as an inoculant and thus prevents supercooling. 15 ref. (E25, Al)

544-E. Melting With Oxygen-Enriched Air in the Cupola Furnace; a Theoretical Study. (In German.) H. Jungbluth. *Neue Giesserei*, v. 37 (new ser., v. 3), Sept. 21, 1950, p. 382-387. (E10, CI)

545-E. Compressed-Air and Jolt-Ramming Molding Machines; and Lifting and Turnover Types. (In German.) B. Gebhardt. *Neue Giesserei*, v. 37 (new ser., v. 3), Sept. 21, 1950, p. 397-405. (E19)

546-E. Copper Phosphide as Deoxidant. (In German.) E. R. Thews. *Neue Giesserei*, v. 37 (new ser., v. 3), Sept. 21, 1950, p. 421-423.

The correct way of adding copper phosphide (with 10-15%) to various nonferrous melts and its effect on them. Reasons why a copper phosphide with 10% P is superior to one with 15% P. (E10, EG-a, Cu)

547-E. Inverted Segregation in Continuous Extrusion Casting. (In German.) Hermann Kästner. *Zeitschrift für Metallkunde*, v. 41, July 1950, p. 193-205; Aug. 1950, p. 247-254.

Results of an extensive experimental and theoretical study of the process and the accompanying segregation. Results of experiments on Sn bronzes and on Al alloys. A large number of analyses of metal from different zones in the castings (rods or tubes) were performed. (E25, Cu, Al)

548-E. New Budd Foundry Produces 500 Brake Drums Per Hour. Thomas MacNew. *Automotive Industries*, v. 103, Nov. 15, 1950, p. 32-33, 110, 112.

Equipment and procedures. (E11, CI)

549-E. 24 Ways To Avoid Trouble in Die Casting Design. Part Three. Hiram K. Barton. *Die Castings*, v. 8, Nov. 1950, p. 25-28.

Examples No. 15 to 24. (E13)

550-E. Casting and Forging of Titanium. J. Bartlett Sutton, Edwin A. Gee, and William B. DeLong. *Metal Progress*, v. 58, Nov. 1950, p. 716-720, 720B.

An induction furnace for melting titanium in graphite. Mechanical properties of the as-cast metal and its forging characteristics. Includes macrographs and micrographs, also hardness conversions for Ti and the relation between hardness and tensile strength. (E10, Q general, F22, Ti)

551-E. Nodular Iron; Theory and Practice. *Metal Progress*, v. 58, Nov. 1950, p. 729-731.

Report on proceedings of a mid-Sept. conference arranged by Howard F. Taylor of MIT. Difficulties existing in the foundry production of nodular iron due to necessary close control of inoculant and variation of properties with section size, may be removed by metallurgical improvements, such as desulphurization in basic cupolas by calcium carbide flux. (E25, CI)

552-E. Use of "Mazout" (Petroleum Residue) **in the Foundry.** (In French.) Georges Ulmer. *Fonderie*, Aug. 1950, p. 2153-2160.

Possibility of use as a fuel in melting and heat treating furnaces. Comparison with other fuels on technological and economic bases. (E10, J general)

553-E. Centrifugal Casting of Bronze Jets. (In French.) Pierre Nicolas. *Fonderie*, Aug. 1950, p. 2161-2162.

Apparatus and procedure for casting jets having an o.d. of 80 mm. and a minimum i.d. of 25-30 mm. (E14, Cu)

554-E. Some Design Principles for Steel Castings. (In German.) Heinrich Resow. *Neue Giesserei*, v. 37 (new ser., v. 3), Oct. 5, 1950, p. 444-448. (E general, CI)

555-E. (Book) **Casting and Forming Processes in Manufacture.** James S. Campbell, Jr. 536 pages. McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y. $5.

Text written for mechanical engineering students, to acquaint them with all of the casting processes, the molding and forming of plastics, powder metallurgy, rolling, forging, sheet-metal working, and punch-press operations. Machine-shop and welding processes are not included. (E general, F general, G general, H general)

556-E. (Book) **Penton's Foundry List, 1949-1950 Ed.** Unpaged. 1949. Penton Publishing Co., Penton Bldg., 1213 W. Third St., Cleveland 13, Ohio.

A directory of gray iron, malleable iron, steel, brass, bronze, aluminum,

and magnesium foundries in the U. S. and Canada, including also pattern shops, machine shops, and laboratories operated as departments.
(E general, A10, CI, Al, Cu, Mg)

557-E. (Book) **International Gieterij Congres 1949—Amsterdam.** (International Foundry Congress 1949—Amsterdam). 309 pages. "Metalen", Drukkerij Uitgeverij "de Hofstad", 1-3 Scheepmakersstraat, 's-Gravenhage, Netherlands.
Complete proceedings of above conference, including 20 papers which are separately abstracted. The latter are in English or French. Other material is in Dutch.
(E general)

558-E. (Book) **Machinenformerei** (Machine Molding). **Ed. 2.** U. Lohse and H. Allendorf. 72 pages. Springer-Verlag, Berlin, Germany. 3.60 DM.
One of a series of workshop manuals relating to production of castings on molding machines. Three main sections describe working principles of the molding machine, machines for manufacturing the mold, and machines for producing cores.
(E19)

F

PRIMARY MECHANICAL WORKING

246-F. Plant Makes Its Own Welded Tubing. *Iron Age,* v. 166, Oct. 19, 1950, p. 86.
Fast and continuous production from coiled steel strip stock at Chevrolet-Flint Mfg. Div., General Motors Corp. At the welding station, the longitudinal joint is seam welded as it passes under a welding wheel turning at a speed equal to the rate of tube travel. (F26, ST)

247-F. The Production and Applications of Copper-Base Alloy Wire. W. D. France, W. L. Wells, and W. E. Johnson. *Wire and Wire Products,* v. 25, Oct. 1950, p. 836-839, 936.
Compositions, properties, applications, and fabrication procedures. Emphasizes practice of Scovill Mfg. Co., Waterbury, Conn. Includes annealing, pickling, finishing, and inspection. (F28, Cu)

248-F. Processing of Aluminum Alloys With Tungsten Carbide Dies. C. E. Hughes and E. T. Miller. *Wire and Wire Products,* v. 25, Oct. 1950, p. 885-886, 902-904.
Recommended procedures for various cold forming operations, such as hydraulic extrusion, wiredrawing, impact extrusion, cold heading. Design of tungsten carbide dies for these operations.
(F24, F28, G5, G10, T5, Al, C-n)

249-F. Ultra-Fast Mill Helps Meet Strip Shortage. D. I. Brown. *Iron Age,* v. 166, Oct. 26, 1950, p. 67-70.
McLouth Steel's new hot rolled strip mill which features single conversion of ingot into strip using a 4-high reversing hot mill. The bloomer is one of the fastest breakdown mills in the world. Includes pickling facilities. (F23, L12, CN)

250-F. Roll-Edging Forging Blanks Saves Steel. *Steel,* v. 127, Oct. 30, 1950, p. 61.
How "single-squeeze" shaping speeds production of forged automotive parts while making possible material savings up to 15%.
(F22, ST)

251-F. Continuous Seamless Pipe Mill Employs One-Diameter Billet. John L. Young. *Steel,* v. 127, Oct. 30, 1950, p. 78, 80.
New mill of National Tube Co. permits production of seamless pipe in multiple lengths and at substantially constant tonnage regardless of diameter or wall thickness. (F26, ST)

252-F. The Cornell Forge Company; Efficiency in Light Forgings Production. *Steel Processing,* v. 36, Oct. 1950, p. 499-503.
Work includes carbon, alloy, stainless steel and Monel metal forgings of 1 oz. to 15 lb. weight.
(F22, ST, Ni)

253-F. Cold Rolling of Tinplate. G. E. Stoltz and J. W. Brinks. *Iron and Steel Engineer,* v. 27, Oct. 1950, p. 69-77; discussion, p. 77-88.
Special tests were made on operation of a modern high-speed mill at Weirton Steel Co. Graphic records were obtained of kilowatt input to the motor-generator sets, motor armature amperes, voltage, speed, roll pressure of each stand, as well as tension between stands and strip thickness out of No. 1 and No. 5 stands. (F23, CN, Sn)

254-F. Strip Rolling Mill. *Engineer,* v. 190, Oct. 6, 1950, p. 345-347.
British-built four-stand tandem strip rolling mill, designed for the high-speed cold rolling of high-carbon and stainless steel strip.
(F23, ST, SS)

255-F. Plastic Deformation of Metals During Drawing and Wire Drawing; Effects of Die Design and Miscellaneous Factors on Mechanical Properties of the Products. (In French.) J. Navarro. *Revue de Métallurgie,* v. 47, Aug. 1950, p. 601-612; discussion, p. 612-613.
Results of a comprehensive experimental and theoretical study. The experiments were performed on electrolytic Cu wires, but the results have been found to be applicable to other metals and alloys. Serious defects caused by shape of the die; effect of shape of die on drawing force required and on mechanical properties; and effect of degree of elongation and rate of drawing on the same factors. 26 ref.
(F28, Q general)

256-F. Cold Working of Metals Simplified. Horace C. Knerr. *Metal Treating,* Sept. 1950, p. 9.
Lead-coating process developed by Metlab Co., whereby repeated annealing operations, with their accompanying pickling, rinsing, relubrication, and much handling, are eliminated, in the manufacture of steel parts which require a series of severe cold working operations through presses, draw benches, etc. Lubricating effect permits heavy reductions without reannealing and without rupture. (F1, G21, ST)

257-F. Standard Belgian Mill Adapted for South American Use. E. C. Peterson. *Steel,* v. 127, Nov. 6, 1950, p. 96, 98, 101.
New Chilean mill is virtually a "jack-of-all-trades" unit producing angles, flats, narrow strip, skelp, and rods with a minimum of hand labor, and at a rate commensurate with the country's needs.
(F23, F27, ST)

258-F. Production of Aluminum Foil. *Light Metal Age,* v. 8, Oct. 1950, p. 14-15.
Picture story at Kaiser Permanente plant, moved from its original site in Germany to Moss Landing, Calif. Includes rolling and annealing. (F23, J23, Al)

259-F. Rolls and Rolling. Part XIX. Channels. E. E. Brayshaw. *Blast Furnace and Steel Plant,* v. 38, Oct. 1950, p. 1174-1182.
Roll-pass diagrams. (F23)

260-F. Continuous Bull Block Operation Speeds Output of Copper Tubing. *Steel,* v. 127, Nov. 13, 1950, p. 106.
Pointing and shearing of the tubing during processing eliminates much of the time usually lost in conventional drawing practice.
(F26, Cu)

261-F. Extruding Magnesium Alloys. G. L. White. *Canadian Metals,* v. 13, Oct. 1950, p. 34-35, 37.
Magnesium extrusion plant of Dominion Magnesium, Ltd., Haley, Ontario, Canada. (F24, Mg)

262-F. Aluminium-Sheet Production. *Aircraft Production,* v. 12, Sept.-Oct. 1950, p. 279.
Northern Aluminium Co.'s continuous strip-rolling mill at Rogerstone in England. (F23, Al)

263-F. Seamless Non-Ferrous Tube Production. A. D. Wilks. *Transactions of the Indian Institute of Metals,* v. 1, June 1948, p. 71-91.
Includes history, melting and casting, extrusion, and drawing.
(F26, EG-a)

264-F. Results of Structural Changes in a Continuous Bloom-Heating Pusher Furnace. (In German.) Oskar J. Stebel. *Stahl und Eisen,* v. 70, Sept. 14, 1950, p. 836-840.
New design of furnace used preliminary to the rolling operation, which resulted in 40% savings in fuel. Operating data and heat-control system. (F21)

265-F. Materials, Rolling Technique, and Considerations of Design in the Production of Aluminum Foils. (In German.) Otto Emicke. *Metall,* v. 4, Oct. 1950, p. 407-416.
Production methods. Compares properties of 99.5 and 99.99% Al.
(F23, Al)

266-F. Chilean Mill Uses Novel Bloom Shear. *Iron Age,* v. 166, Nov. 16, 1950, p. 96.
Above shear has a hydraulically operated hold-down gag which automatically adjusts both itself and the stroke of the depressing table to the thickness of the slab. Advantages are a clean square cut and reduction of maintenance costs on both the depressing and shear approach tables. (F29)

267-F. Continuous Rolling of Aluminium: Northern Aluminium Company's New Strip Mill at Rogerstone. *Metal Industry,* v. 77, Sept. 22, 1950, p. 143-146; Sept. 29, 1950, p. 167-169.
(F23, Al)

268-F. A Continuous Aluminium Strip Mill; Modern Production Methods at Rogerstone. *Metallurgia,* v. 42, Oct. 1950, p. 223-232.
See also above abstract, item 267-F. (F23, Al)

269-F. Work and Power in the Rolling Process. (In Polish.) Z. Wusatowski *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 2, no. 3, 1950, p. 213-267.
Extensive theoretical and mathematical analysis. Various methods of calculation. Practical ways of calculation of work and power in hot and cold rolling process. Effect of tension of metal by coilers. Many diagrams published in foreign literature and numerous examples of practical application and calculation. 51 ref. (F23)

270-F. Flame Finishing To Remove Defects From Steel Ingots and Billets. (In Russian.) A. I. Brodskii. *Avtogennoe Delo* (Welding), v. 21, Aug. 1950, p. 17-20.
Different types of defects appearing in finished and semifinished articles after cold and hot working, rolling, and welding, and methods for minimizing them by flame treatment. (F21, G22, CN)

271-F. Nature of the Mechanism of Fracture of Highly Alloyed Metals During Upsetting. (In Russian.) M. V. Rastegaev. *Izvestiya Akademii Nauk SSSR,* (Bulletin of the Academy of Sciences of the USSR), Section of

Technical Sciences, Aug. 1950, p. 1183-1188.

Experimentally investigated for a high-alloy steel heated to 400-1270° C. and then hot worked during cooling. It was found that the direct cause of fracture of brittle high-alloy steels during upset forging is phase transformation of overheated portions in shear planes formed by nonuniform deformation. (F22, Q26, AY)

G

SECONDARY MECHANICAL WORKING

327-G. Cold Extrusion of 105 MM. Shells Saves Steel. D. I. Brown. *Iron Age*, v. 166, Oct. 19, 1950, p. 69-75.

Process at Mullins Mfg. Corp. is said to cut steel requirements by 40% over previous forging methods. Mn content of the steel grade is also cut in half and no heat treatment is necessary. Better tolerances, both on weight and size, are obtained and steel quality is less critical in cold extrusion than in hot forging. (G5, CN)

328-G. Designing Around a Process. R. F. Helmkamp. *Welding Journal*, v. 29, Oct. 1950, p. 887-892.

Specialized flame-cutting equipment and its varied applications in production. (G22)

329-G. Pratt & Whitney Draws Tough Alloys to Close Limits. Robert M. Treat. *Steel*, v. 127, Oct. 23, 1950, p. 68-70.

How aircraft engine parts containing 80% Ni and 20% Cr are made on hydraulic presses to tolerances that eliminate machining. (G4, T24, Ni)

330-G. Fundamentals of the Working of Metals. George Sachs. *Modern Industrial Press*, v. 12, Oct. 1950, p. 6, 8, 10, 46.

Development of compressive stresses in drawing processes; drawing of rod and wire; cupping and shrink flanging; tube drawing, redrawing and reducing processes; drawing failures; drawability; ductility and intermediate anneals; and prevention of wrinkling and puckering. (G4, F26, F27, F28)

331-G. Trion Electric Air Filters Bustling Newcomer in Metalworking Industry. Walter Rudolph. *Modern Industrial Press*, v. 12, Oct. 1950, p. 22, 24, 26, 28.

Equipment and procedures for production of equipment for electrostatic cleaning and purifying of air and other gases. Processes include shearing, stamping, bending, and other press operations; oxyhydrogen and arc welding; and enameling. (G1, K1, K2, L26)

332-G. Design Makes the Difference. Stephen Baur. *Iron Age*, v. 166, Oct. 26, 1950, p. 61-65.

Examples in which redesign resulted in greater sales appeal because of appearance and performance improvements, also in lowered manufacturing costs. (G general)

333-G. Stamping Deep Drawn Parts at Transue-Williams. John C. McComb. *Steel Processing*, v. 36, Oct. 1950, p. 491-498.

Equipment and procedures. Emphasizes production of engine oil pans. (G3, ST)

334-G. Stretch Wrap Forming Saves Cost—Speeds Production at North American Aviation Inc. J. J. Sloan. *Western Metals*, v. 8, Oct. 1950, p. 34-36.

(G9)

335-G. Efficient Oxygen Cutting; Methods of Achieving Accurate Results. Lewis L. Arundel. *Welding*, v. 18, Sept. 1950, p. 399-403; Oct. 1950, p. 442-445.

Theory and practical recommendations for proper torch adjustment. Diagrams show proper appearance of flame. Part 2: various factors influencing accuracy of the cut. Available fuel gases compared. Suggestions regarding tolerances for different classes of work. (G22)

336-G. Investigation of Lubrication Effect During Deep Drawing by Use of a Model. (In Russian.) S. Ya. Veiler, L. A. Shriner, and P. A. Rebinder. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, July 21, 1950, p. 511-513.

Proposes a new method for the above, based on deep drawing of a plate. The method permits determination not only of tangential forces of drawing, but also radial-compressive forces for different degrees of deformation. By use of this method, it is also possible to investigate deep-drawing lubricants and to determine the deep drawability of metals. (G4, G21)

337-G. Die Cost Cut by Tool Shop Foundry. Walter G. Patton. *Iron Age*, v. 166, Nov. 2, 1950, p. 81-83.

Zinc alloy foundry of Richard Bros. Div., Allied Products Corp., Detroit, tool and die manufacturers. The low-cost dies produced are used for die-design tryouts on difficult stampings before permanent tooling is considered. They are also ideal for short or experimental runs. (G3, E general, Zn)

338-G. A Comparison of Methods for Cutting Hardened Steel. H. J. Chamberland. *Production Engineering & Management*, v. 26, Nov. 1950, p. 65-68.

Recent developments in the use of Al_2O_3 matrices for straight-line and contour cutting of hard materials suggest many possibilities for economies when the surface finish is important. (G17, ST)

339-G. Welded Rail Costs Trimmed. *Welding Journal*, v. 29, Nov. 1950, p. 1002.

Hot-trimming device, used for the first time on the Illinois Central continuous welded-rail program in South Chicago, which has reduced grinding operations to one-fifth of the usual amount. (G22, CN)

340-G. New Lathes Bore and Rough Turn at Record Rates. C. W. Heppenstall. *Iron Age*, v. 166, Nov. 9, 1950, p. 85-87.

Two lathes, developed in Germany and shortly to be built in the U. S., operate at rates well in excess of current American practice. A trepanning lathe bores holes in forgings at rates as high as 41 ft. per hr. A rough turning lathe can remove metal at rates up to 2000 lb. per hr. in forgings up to 33 ft. long. (G17)

341-G. Machinability Research Program Reported. *Iron Age*, v. 166, Nov. 9, 1950, p. 99-102.

Summarizes new book published by Curtiss-Wright Corp., which gives details of work sponsored by the U. S. Air Force and participated in by Ford Motor Co., Metcut Research Associates, and M.I.T., as well as Curtiss-Wright. Mechanical and machining properties of high-temperature alloys, flake and nodular cast iron and cast steel. (G17, SG-h, CI)

342-G. Producing Hollow Steel Aircraft Propeller Blades. George H. DeGroat. *Machinery* (American), v. 57, Nov. 1950, p. 137-143.

Equipment and procedures for production from high-alloy steel. Operations include honing, cold taper rolling, swaging and crimping, hot forming, stretch forming, seam welding, sand blasting, grinding, and milling. (G general, K3, L10, T24, AY)

343-G. Hot-Joggling Aluminum Extrusions. Thomas E. Piper. *Machinery* (American), v. 57, Nov. 1950, p. 144-148.

Equipment and procedures for above press-forming operation, applied by Northrop Aircraft to miscellaneous 75S-T Al parts. Comparison of oil-immersion and electrical resistance heating methods. (G1, J2, Al)

344-G. Some New Concepts in Bending. Ralph M. Shaw, Jr. *Machinery* (American), v. 57, Nov. 1950, p. 149-152, 165.

The four basic bending processes: compression, draw, roll, and ram. How to avoid wrinkling during bending and how to avoid springback. New adaptations of old methods. (G6)

345-G. Dry Drawing Lubricants for Deep Drawing Operations. Richard F. Roy. *Finish*, v. 7, Nov. 1950, p. 27-28, 75-76.

Characteristics and methods of application to steel. (G21, ST)

346-G. "Curvilineal" Machining Now in Bailiwick of Planers, Shapers. Guy Hubbard. *Steel*, v. 127, Nov. 13, 1950, p. 94-97.

How traditional limitations of planers and shapers to machining of shapes by the projection of straight lines are removed by use of hydraulic tracer-controlled tooling. (G17)

347-G. Press Forming Aluminum Alloys. E. V. Sharpnack. *American Machinist*, v. 94, Nov. 13, 1950, p. 171, 173.

Recommended procedures as related to the various types. Shear, yield, and tensile strengths, also percent elongations, are tabulated for 35 alloy-and-temper combinations. (G1, Al)

348-G. Hawaii Scraps Its Big Guns. W. R. Laurance. *Welding Engineer*, v. 35, Nov. 1950, p. 20-21.

How obsolete guns were cut up by use of oxy-acetylene torches. (G22, CN)

349-G. A Systematic Investigation Into the Band-Saw Cutting of Aluminium and Its Alloys. E. Von Burg. *Engineers' Digest*, v. 11, Oct. 1950, p. 349-352. Translated and condensed.

Previously abstracted from *Schweizer Archiv für angewandte Wissenschaft und Technik*. See item 129-G, 1950. (G17, Al)

350-G. Presswork Production; An Examination of the Technique of Using Progressive Tools. R. Kirchner and G. V. Bevan. *Sheet Metal Industries*, v. 27, Oct. 1950, p. 851-870.

A survey of various types of progressive tools and some of the advantages and disadvantages of this method of tooling. (G1)

351-G. Bent Structural Members: Some Aspects of the Design and Manufacture of Formed Aircraft Parts. Part I. Bending by Semi-Concentrated Loads and by Stretch-Bending. Part II. Heat Treatment and Strength Values of Aluminium-Alloy Materials. Incidence of Sheet-Forming Operations. R. M. Howarth. *Aircraft Production*, v. 12, Aug. 1950, p. 252-256; Sept.-Oct. 1950, p. 294-296.

The possible effects upon Al alloy structural materials of different methods of deformation. Results of bending by semi-concentrated loads and by stretch-bending; points out that finished products made by the two methods, although superficially alike, are, in fact, totally dissimilar. Concluding installment: The relation of heat treatment to the forming operation. Recommendations as to the most suitable stage for forming operations. (G6, J general, Al)

352-G. Joggling. *Aircraft Production*, v. 12, Sept.-Oct. 1950, p. 280-281.

Practice of North American Aviation Corp. in manipulating extrusions and formed-sheet sections of Al alloys and stainless steel. (G1, Al, SS)

353-G. Hot-Dimpling. *Aircraft Production,* v. 12, Sept.-Oct. 1950, p. 289-291.

Process for high-strength light-alloy sheet developed by Short Brothers and Harland, Ltd., in Britain. (G2, Al)

354-G. Erosion Boring. (In German.) W. Brunst. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 92, Sept. 11, 1950, p. 750-751.

How holes can be drilled through the hardest steel by use of an underwater arc between an electrode and the steel. (G22, ST)

355-G. Flexibility Key to Efficient Gear Production. John Elwood. *Iron Age,* v. 166, Nov. 16, 1950, p. 83-86.

Equipment and procedures for mass production of over 200 types of gears, plus much job-lot production, at Caterpillar Tractor Co. (G17)

356-G. The Cold Working of the Stainless Steels. Part III. Shallow and Deep Drawing. Lester F. Spencer. *Steel Processing,* v. 36, Oct. 1950, p. 504-509.

Compares cold workability of the various types. (To be continued.) (G4, SS)

357-G. Design Simplicity Key to Blower Wheel Manufacture. *Steel,* v. 127, Nov. 20, 1950, p. 100-102.

Procedures and equipment. Process includes stamping, automatic screw-machine operations, drilling, and tapping, rolling, assembly, and inspection. Materials are steel and aluminum. (G general A5, S general, Al, ST)

358-G. The Fabrication of Wrought Magnesium. Part I-II. Deep Drawing. Fred L. Church. *Modern Metals,* v. 6, Oct. 1950, p. 31-34; Nov. 1950, p. 42-45.

Deep drawing presses and dies, the heating of dies, and lubricating practice. Illustrates recommendations by giving step-by-step description of a B-36 bomber part known at a "waffle grid". This part is used to stiffen the unsupported trailing edges of the wings. It is applied by resin bonding. (To be continued.) (G4, T24, Mg)

359-G. The Fabrication of Magnesium Assemblies. J. S. Kirkpatrick. *Modern Metals,* v. 6, Nov. 1950, p. 27, 29, 31.

Methods used by Brooks & Perkins, Detroit, for drawing, die forming, stretch forming, hydro forming, hand forming, gas-shielded arc welding, riveting, and adhesive bonding of wrought Mg. (G general, K general, Mg)

360-G. The Oxygen Lance for Burning Holes in Concrete, Minerals, and Steel. (In German.) R. Wolf and E. Zorn. *Schweissen und Schneiden,* v. 2, June 1950, p. 154-157.

Principles of the equipment, effect of quantity of oxygen, and of concrete or mineral composition. The cutting of holes in steel. Thermal efficiency is charted. (To be continued.) (G22, ST)

361-G. Experimental Investigation of Fine Turning. (In Russian.) A. G. Nalchan. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Aug. 1950, p. 18-19.

Investigated with respect to cutting forces, character of wear of the cutting edge, temperature of cutting, influence of turning on fineness of the worked surface, and possibility of replacing diamond with metallic tips. Special apparatus designed for the investigation. (G17)

362-G. Operation of an Auxiliary Cutting Edge. (In Russian.) S. F. Glebov. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Aug. 1950, p. 21-24.

Investigation to determine the nature of the process of secondary cutting and the mode of action of the secondary edge. Theory of the process of auxiliary cutting developed on the basis of experimental results permits logical design of cutting tools for different applications. (G17)

363-G. The Problem of Treatment of Results of Investigation of Cutting of Metals. (In Russian.) N. I. Leonov. *Stanki i Instrument* (Machine Tools and Equipment), v. 21, Aug. 1950, p. 24.

The best method of plotting the relationship of time required for dulling to cutting speed; recommends use of log-log charts. (G17)

364-G. Cutting Torches Operating on Combustible Gases Substituted for Acetylene. (In Russian.) A. K. Winburg. *Avtogennoe Delo* (Welding), v. 21, Aug. 1950, p. 22-23.

Experimental investigation of the applicability of natural gas, methane, city gas, and coke-oven gas instead of acetylene to flame cutting of low-carbon steel plate up to 300 mm. thick. (G22)

365-G. (Book) **Principles of Stretch-Wrap Forming.** 87 pages. 1950. Hufford Machine Works, Inc., 207 North Broadway, Redondo Beach, Calif. $5.

Attempts to clarify many ideas and to include as much tooling information and as many actual operating examples as are available at present. The theory, advantages, and uses of stretch-wrap forming equipment in modern aircraft manufacture; detailed tooling procedures and form-die construction data. Courtesy copies will be sent to foremen, superintendents, and executives in the aircraft industry. (G9, T24, Al, Mg)

366-G. (Book) **Werkzeug-Handbuch über Schneidwerkzeuge für die Metallbearbeitung.** (Tool Handbook on Cutting Tools for Metal Working). F. Pütz. 418 pages. 1950. Carl Hanser Verlag, Munich 27, Germany. 34 DM.

A guide for the purchaser of tools and an aid to the engineer and machinist in the correct selection of the proper tool for a specific application. Characteristics, applications, and limitations of various types of drills, reamers, milling, cutting, threading, and other tools. Efficiency of various toolsteels in the machining of different metals and alloys. A section on maintenance and care of tools is included. (G17, TS)

H

POWDER METALLURGY

88-H. Sintering Mechanism Between Zirconium Carbide and Columbium. H. J. Hamjian and W. G. Lidman. *National Advisory Committee for Aeronautics,* Technical Note 2198, Oct. 1950, 29 pages.

A ZrC-Cb ceramal containing 12.5% Cb was investigated. Specimens were prepared by hot-pressing and effects of sintering temperature and time at temperature were investigated. A bonding study was made of a hot-pressed ZrC specimen and Cb powder. (H15, C-n Zr, Cb)

89-H. The Powder Metallurgy of Beryllium. H. H. Hausner and N. P. Pinto. *U. S. Atomic Energy Commission,* AECD-2869, Mar. 24, 1949, 64 pages.

See abstract of *American Society for Metals,* Preprint No. 38, 1950, item 74-H. (H14, H15, Be)

90-H. Production of the Heavy Metals by Electrolysis of Molten Salts. IV. Melt Electrolysis in the $FeCl_2$-NaCl System. (In German.) M. Clasing and F. Sauerwald. *Zeitschrift für Elektrochemie und angewandte physikalische Chemie,* v. 54, Aug. 1950, p. 358-361.

The production of powdered iron from the eutectic $FeCl_2$-NaCl solution with a rotating cathode. Effects of temperature, current density, rate of rotation, etc. (H10, Fe)

91-H. Considerations in Designing Tools for Powder Metallurgy. Irving J. Donahue. *Mechanical Engineering,* v. 72, Nov. 1950, p. 886-889.

Designs of tools for pressing powdered metal parts. (H14)

92-H. Fundamental Concepts in Sintering and Properties of Cermets of the Oxide Metal Type. T. S. Shevlin and G. A. Bole. *Engineering Experiment Station News* (Ohio State University), v. 22, Oct. 1950, p. 22, 41-46.

Experiments with magnesia, nickel, and cobalt, in which the surface-oxidized molten metals wet the magnesia tile and the unoxidized metals do not, corroborate previous work on the development of wetting and bonding between metals and ceramic oxides. The theory of wetting ceramic oxides by metals through a mechanism involving the metal oxide was successfully applied to certain cermet compositions. However, properties of cermets are often not linear functions of composition. (H15, Ni, Co)

93-H. Electrodeposition of Metal Powders. Gustaf Wranglen. *Journal of the Electrochemical Society,* v. 97, Nov. 1950, p. 353-360.

Metal powders may be produced electrolytically by direct deposition on the cathode and grinding of a brittle deposit. Principles underlying the method. Three factors are shown to be responsible for formation of powdery or spongy deposits: low metal overvoltage, depletion of the metal content of the cathode film, and hydroxide formation in the cathode film. Powder formation on the cathode in the electrolysis of Cu, Fe, Ni, Zn, and Cd is analyzed. 20 ref. (H10, Cu, Fe, Ni, Zn, Cd)

94-H. Infiltrated or Impregnated Alloys. H. W. Greenwood. *Engineer,* v. 190, Oct. 20, 1950, p. 384-385.

The filling of pores of a sintered or unsintered compact with a metal or alloy of lower melting point by capillary action; usually by immersion in a bath of liquid metal. (H16)

95-H. The Sintering of Aluminum Alloys. (In German.) A. von Zeerleder. *Zeitschrift für Metallkunde,* v. 41, Aug. 1950, p. 228-231.

The sintering of commercially pure Al powder. The sintered metal was found to have excellent mechanical properties. Comparative properties of this material, pure Al, and two Al alloys. (H15, Al)

96-H. Processes Occurring During the Sintering of Hard-Metal Alloys. (In German.) Walther Dawihl and Karl Schröter. *Zeitschrift für Metallkunde,* v. 41, Aug. 1950, p. 231-233.

Literature review shows that the fact that Co promotes the sintering of tungsten alloys is due to the ability of Co to dissolve solid and liquid WC. 13 ref. (H15, C-n, W)

97-H. Powdered Iron Blades for Gas Turbines. Joseph Geschelin. *Automotive Industries,* v. 103, Nov. 15, 1950, p. 40-41, 58.

Production methods by Thompson Products, Inc. After coining, the blades are subjected to infiltration with a Cu alloy. Straightening, degreasing, heat treatment, grinding, electroplating with Cu-Ni-Cr alloy, and inspection are other steps in production of finished blades. (H16, T25, Fe, Cu)

J

HEAT TREATMENT

239-J. Good Carburizing Practice. I. The Carburizing Process and Pack Carburizing Compounds. Application of Pack and Gas Carburizing. T. A. Frischman. *American Machinist*, v. 94, Oct. 16, 1950, p. 131-135; Oct. 30, 1950, p. 90-94.

Advantages and disadvantages of the process. (J28, ST)

240-J. Heat Treatment of Gears and Bands for Buick Dynaflow Transmission. Harold A. Maloney. *Industrial Heating*, v. 17, Oct. 1950, p. 1694-1696, 1698, 1700, 1702, 1704, 1864-1866.

Equipment and procedures. (J general, T21, ST)

241-J. Selection of Alloys for Dry Cyaniding and Gas Carburizing Applications. C. E. Wenger and G. C. McCormick. *Industrial Heating*, v. 17, Oct. 1950, p. 1751-1752, 1754.

Problems of selection, especially in the light of government allocations of nickel. (J28)

242-J. Carbon Restoration Improves Wear Resistance. Samuel Damon. *Steel*, v. 127, Oct. 23, 1950, p. 66-67.

How surface physical properties, including wear resistance and fatigue strength of steel parts decarburized by hot forming, can be greatly enhanced by recarburizing during heat treatment in a controlled atmosphere. (J28, ST)

243-J. Master Curves Simplify Stainless Tempering. A. E. Nehrenberg. *Steel*, v. 127, Oct. 23, 1950, p. 72-74, 76, 88.

Practical application of the curves is extended to the hardenable stainless steels, Types 410, 416, and 420, and to a number of common high-alloy hot work steels. A new chart eliminates mathematical computations formerly required. (J29, AY, TS, SS)

244-J. Combination Quenching Process. Glen A. Robinson. *Western Machinery and Steel World*, v. 41, Oct. 1950, p. 60-63.

See abstract of "Combustion Quench Reduces Aluminum Warpage", *Iron Age*, item 171-J, 1950. (J27, Al)

245-J. New Heat-Treating Furnace for Screw Machine Parts. *Western Machinery and Steel World*, v. 41, Oct. 1950, p. 70-71.

All-electric, semi-automatic pusher furnace with loading and quenching vestibules and accurately controlled atmosphere. (J26, CN)

246-J. Use of Oxy-Acetylene Process To Reduce Stress. Harry E. Kennedy. *Western Machinery and Steel World*, v. 41, Oct. 1950, p. 78-80.

Basic principles, mainly as applied to welding. (J2, K2)

247-J. Quench Controller for Steel. Walter K. Halstead and L. D. Jaffe. *Electronics*, v. 23, Nov. 1950, p. 109-111.

Apparatus in which improved control of quench time in cooling heat treated steel parts is obtained by taking advantage of the fact that hot steel is not ferromagnetic. The cooled part becomes magnetic and changes flux linkage between inductors so that an amplified signal actuates alarms. (J26, ST)

248-J. A Simple Method for Localized Annealing of Aluminum Sheet. *Modern Metals*, v. 6, Oct. 1950, p. 28.

Method using a neutral oxy-acetylene flame from a standard welding blow-pipe. (J2, Al)

249-J. Furnaces; the Pittsburgh Commercial Heat Treating Company. John C. McComb. *Steel Processing*, v. 36, Oct. 1950, p. 517-523.

Equipment and procedures. Includes facilities for brazing, electroplating, and other surface treatments. (J general, K8, L17)

250-J. Induction Machine Hardens Conveyor Wheels. *Steel Processing*, v. 36, Oct. 1950, p. 523-524. (J2, ST)

251-J. Gas Plays Important Part at Columbia's Sheet and Tin Mill. *Western Metals*, v. 8, Oct. 1950, p. 37-39.

Use of gas-fired furnaces for annealing and hot-dip or electrolytic tin plating or galvanizing. (J23, L16, L17, CN)

252-J. Two New Methods of Hardening and Surface Restraining by Carbonitriding of Steel Parts. (In French.) Jacques Pomey, Francois Goutel, André Veragen, and René Le Roux. *Comptes Rendus* (France), v. 231, July 10, 1950, p. 148-150.

Methods in which the parts are held between the A_2 temperature of the eutectoid Fe-C and the lowest temperatures of reversible equilibrium of Fe-C-N alloys. (J28, ST)

253-J. Transition Phenomena of Hardening by Dissolution. (In French.) Francis Aubertin and Charles Crussard. *Comptes Rendus* (France), v. 231, July 31, 1950, p. 353-354.

The phenomenon was investigated by a thermo-electric method on impure Al (0.14% Fe, 0.012% Cu, 0.06% Si) and an Al-Mg alloy (12% Mg). Possible causes are tentatively explained. Suggests designation of such phenomena as "structural hardening by dissolution" for differentiation from the normal increase in hardness caused by enrichment of a homogeneous solid solution. (J27, N7, Al)

254-J. Short-Time Annealing. (In Czech.) Milos Spevak. *Hutnické Listy*, v. 5, July 1950, p. 274-277.

Results of a study of effects of various cold working and annealing factors on recrystallization of a 6% Sn bronze. (J23, N5, Cu)

255-J. Selective Hardening Enables Machine Speedup. Douglas Godby. *Iron Age*, v. 166, Nov. 2, 1950, p. 93-94.

From over-all hardening prior to machining, Buick changed to induction heating only where needed on a transmission part. The change raised production by permitting use of higher machining speeds. (J26, J2, G17, ST)

256-J. Heat Treatments; Their Selection and Specification in Design. Part 2. Hardness. Norman N. Brown. *Machine Design*, v. 22, Nov. 1950, p. 115-119.

The various treatments and their applicabilities. Recommendations. (J general)

257-J. Radivection — Equated Heating. Al. W. Davis. *Metal Treating*, Sept. 1950, p. 4-6, 14.

Improved heat treating furnace design for use at 250-1750° F. Use of a new system of heat transfer results in improved temperature uniformity during both stages of treatment. Economy in operation and increased production are achieved by use of combined radiation and convection heating. (J general)

258-J. New Quenching Process for Aluminum. Gilbert Close. *Light Metal Age*, v. 8, Oct. 1950, p. 6-7, 20.

Combination fog-water quenching process for heat treatable Al alloy sheet stock which is proving highly practical in reducing quench warpage and minimizing subsequent straightening operations. (J26, Al)

259-J. Electronic Control of Production Flamatic Hardening. Milton Garvin and David Strauchen. *Welding Journal*, v. 29, Nov. 1950, p. 981-985.

New developments in production flame hardening of parts, including electronic temperature control of the surface and depth control of hardening. (J2)

260-J. Use of Oxyacetylene Process To Reduce Stress. Harry E. Kennedy. *Welding Journal*, v. 29, Nov. 1950, p. 985-988.

Residual stresses and conditions under which they may become dangerous, as well as methods for relieving them. (J1, J2)

261-J. Surface Hardening Vs. Fatigue in Steel. J. M. Berry and H. J. Grover. *Industrial Gas*, v. 29, Nov. 1950, p. 10-11, 25.

Test results indicate that surface hardening by means of high-speed heating raises notch-fatigue strength. Effects of induction hardening were compared with those of high-speed gas heating. Both treatments restored the fatigue strength present before notching. (J26, J2, ST)

262-J. Principles of Heat Treatment. J. S. Vatchagandhy. *Transactions of the Indian Institute of Metals*, v. 3, 1949, p. 23-47; discussion, p. 47-50.

Comprehensive survey of fundamental and practical aspects, mainly as applied to steels. 14 ref. (J general, N8, ST)

263-J. Quenching of Steels. U. V. Bhat. *Transactions of the Indian Institute of Metals*, v. 3, 1949, p. 51-81; discussion, p. 81-84.

Comprehensive survey, including experimental methods; effects of size and shape on cooling in different media; comparison of different coolants; and relation of cooling rates and depth-hardening properties of steels. 14 ref. (J26, ST)

264-J. Hardenability of Steels. Vijay G. Paranjpe. *Transactions of the Indian Institute of Metals*, v. 3, 1949, p. 85-110.

The hardenability concept, determination of hardenability, factors affecting hardenability, calculation of hardenability, and selection and specification of steel. 53 ref. (J26, ST)

265-J. Uncertainties in Influence of Alloys on Hardenability. M. A. Grossmann. *Transactions of the Indian Institute of Metals*, v. 3, 1949, p. 111-127; discussion, p. 127-129.

Present status of information in regard to the quantitative effects of alloys on the hardenability of steel, indicating unsolved problems. 22 ref. (J26, ST)

266-J. Tempering of High Carbon Steels. E. G. Ramachandran and Dara P. Antia. *Transactions of the Indian Institute of Metals*, v. 3, 1949, p. 131-142; discussion, p. 142-145.

Transformations and hardness changes which occur during tempering. 12 ref. (J29, N8, CN)

267-J. Heat Treatment of Two Commercial Tool Steels. S. Visvanathan. *Transactions of the Indian Institute of Metals*, v. 3, 1949, p. 147-162; discussion, p. 162-164.

As applied to two types of shallow hardening toolsteels: coinage die steels and tap steels. Compositions and applications of several types of each. (J general, TS)

268-J. Heat Treatment of High Speed Steels. P. H. Tata and K. N. P. Rao. *Transactions of the Indian Institute of Metals*, v. 3, 1949, p. 165-179; discussion, p. 179-183.

The fundamental changes which take place and deviations from conventional practice. Does not discuss commercial heat treating equipment or practical aspects of procedure. Considers mainly the 18-4-1 W-Cr-V type with some reference to 6-6-2 Mo-W-V and 5-18-4-1 Co-W-Cr-V types. (J general, N8, TS)

269-J. Comparison of Gas and Bath-Nitriding. H. Schrader. *Transactions of the Indian Institute of Metals*, v. 3, 1949, p. 185-225; discussion, p. 225-227.

Loss in core ductility of the various types of constructional steels during nitriding and influence of al-

loy additions upon their nitridability. Factors influencing toughness of the nitrided layer were examined using different test methods. The most useful application of both nitriding methods. 44 ref. (J28, CN)

270-J. Equipment for the Heat Treatment of Steel. R. A. P. Misra. *Transactions of the Indian Institute of Metals,* v. 3, 1949, p. 253-278.

An illustrated survey. (J general, ST)

271-J. Quick Estimation of Case Depth. Marie H. Whitehill. *Metal Progress,* v. 58, Nov. 1950, p. 735.

Simple technique which does not require mounting in bakelite. (J28)

272-J. Cementation by Carbon and Nitrogen. (In French.) J. Pomey. *Revue de Métallurgie,* v. 47, Sept. 1950, p. 637-657.

Carburizing, nitriding, and the combined process — carbonitriding — as applied to steel. Results of a comprehensive theoretical and experimental study. The three phases of the cementation reaction are analyzed: chemical reaction of the atmosphere with the metal surface at high temperature; simultaneous diffusion into the austenitic surface layers; and heat treatment involving quench hardening of the surface layer. (To be continued.) (J28, ST)

273-J. Evolution in the Design of Electric Furnaces. (In French.) F. Barbas. *Métaux et Industries,* v. 1, No. 1, 1950, p. 24-32.

Reviews progress, particularly from the point of view of gas tightness, permitting heat treatment in different atmospheres. (J2)

274-J. Induction Heat Treatment of Welds. (In Russian.) V. V. Alexandrov and T. A. Vashurova. *Promyshlennaya Energetika* (Industrial Power), v. 7, Aug. 1950, p. 13-15.

Possibility of induction heating welds with high rates of heating and without holding at the heat treatment temperature. Butt welded carbon steel plates (0.17-0.27% C) and butt welded pipe sections of Mo steel were investigated. (J2, CN, AY)

K

JOINING

635-K. Templets Locate End-Welded Studs. H. W. Bartley. *American Machinist,* v. 94, Oct. 16, 1950, p. 142-144.

Procedure. (K1)

636-K. Induction Heat Cuts Soldering Cost in Half. Charles H. Yetman. *Iron Age,* v. 166, Oct. 19, 1950, p. 81-83.

How replacing a hand gas torch with induction heating for soldering brass name-plate mounting studs eliminated warpage, cut solder cost, and increased production rate. (K7, Cu)

637-K. Rehabilitation of Ore Cars. J. F. Likarish. *Welding Journal,* v. 29, Oct. 1950, p. 837-843.

Rebuilding of 400 of the older cars by welded construction. (K1, T23, CN)

638-K. A Practical Method for Obtaining Consistent Resistance Welds. J. W. Kehoe. *Welding Journal,* v. 29, Oct. 1950, p. 844-855.

Plan for applying a recommended spot welding schedule in production through simple correlation of the characteristics of a specific spot welding machine with the schedule. (K3)

639-K. Better Welding at Lower Cost. Lew Gilbert. *Welding Journal,* v. 29, Oct. 1950, p. 855-862.

A general discussion of factors which determine quality and cost of welding. Hints for securing improved quality at lower cost. (K general)

640-K. Variables in Cross-Wire Welding of Dissimilar Metals. I. S. Goodman. *Welding Journal,* v. 29, Oct. 1950, p. 863-875.

Because of the current expansion of radar, television, therapeutic, and industrial lighting and similar electrical and electronic industries, the quality of cross-wire welds incorporated into filament structures becomes more important. Variables in cross-wire resistance welding of Ni, Fe, Mo, and W wires to each other in various sizes from the viewpoints of equipment supplier, equipment user, and product manufactured. Among these are strength, conductivity, rotation, intergranular corrosion, walk-out, noise, vapor pressure, and ease of welding. Equipment variables include timers, electrode materials, welder heads, and transformers. (K3, T1, Ni Fe, Mo, W)

641-K. Welding High-Pressure, High-Temperature Piping. H. J. Irrgang. *Welding Journal,* v. 29, Oct. 1950, p. 876-879.

Some practical hints for meeting the exacting specification requirements of the materials involved. (K general, ST)

642-K. Welding Aluminum With Inert Arc D. C. John W. Mortimer. *Welding Journal,* v. 29, Oct. 1950, p. 879-881.

Advantages of the inert-gas-shielded arc using direct current and helium gas. Includes weld macrographs. (K1, Al)

643-K. Fabrication of Main-Line Road and Switcher Locomotives. F. T. Perry. *Welding Journal,* v. 29, Oct. 1950, p. 882-886.

Procedures and sequence of operations, mainly arc welding and spot welding. (K1, K3, T23, CN)

644-K. Jigs and Fixtures for Inert-Gas Arc Welding. H. A. Huff, Jr. and A. N. Kugler. *Welding Journal,* v. 29, Oct. 1950, p. 893-903.

Need for jigs and fixtures and the necessity to design these fixtures for the newer welding processes involved as well as for the product to be made. (K1, CN)

645-K. Mechanizing Brazing Operations. *Welding Journal,* v. 29, Oct. 1950, p. 903.

Use of silver alloy brazing for assembly of stamped steel lock parts. (K8, CN)

646-K. Hints for White Metal Welding. E. V. Olson. *Welding Journal,* v. 29, Oct. 1950, p. 904-907.

Gas welding procedures on automotive die castings. (K2, Sn, Sb, Pb)

647-K. A New Method of Brazing and Soldering. Charles Boyden, Sr. *Welding Journal,* v. 29, Oct. 1950, p. 907-909.

"Gun" method usually used in connection with a conveyer for moving the work past the gun. Sometimes, however, the gun moves and the work is stationary; or both gun and work may move together. (K8, K7)

648-K. Welding Vs. the Future Bridge Engineer. Alois Cibulka. *Welding Journal,* v. 29, Oct. 1950, p. 909-910.

Design and construction of welded bridges. The various types and their comparative properties. (K general, T26)

649-K. Optimum Flash-Welding Conditions for Aluminum Alloys—the Importance of Upset Variables. E. F. Nippes, W. F. Savage, J. J. McCarthy, and P. Patriarca. *Welding Journal,* v. 29, Oct. 1950, p. 497s-511s.

Results of investigation indicated that nearly 100% tensile-joint efficiency could be attained by flash welding the alloys 61S-T, 14S-T, 75S-T, and 24S-T. A comprehensive study of the peak temperature reached by the metal near the final weld line and the temperature distribution around it proved helpful in evaluating optimum welding conditions. Upset-pressure requirements for producing various amounts of upset per specimen up to 1.5 times the section thickness; influence of welding variables on these requirements. Magnitude of upset current was found to be the most important variable influencing upset pressure requirements. (K3, Al)

650-K. The Spreading Resistance of Contacts. W. B. Kouwenhoven and W. T. Sackett, Jr. *Welding Journal,* v. 29, Oct. 1950, p. 512s-520s.

Study of electrical resistance of contacts resulting from constricting effect of the contact subareas which produces nonuniform current flows in the contact material. Application of the information to resistance welding. (K3)

651-K. Energy Distribution in Electric Welding. *Welding Journal,* v. 29, Oct. 1950, p. 520s-521s.

Discussion by Merrill Skolnik of above paper by C. E. Jackson and A. E. Shrubsall (May issue, item 306-K). Includes authors' reply. (K1)

652-K. New Procedures for Studying Electrode Coverings. Jay Bland and Solomon Goldspiel. *Welding Journal,* v. 29, Oct. 1950, p. 522s-529s.

New procedures for following variations in moisture contents with time; and for identification and analysis of electrode coatings by X-ray spectrometer and optical spectrographic methods. (K1, T5)

653-K. Notch Sensitivity of Welded Steel Plate. *Welding Journal,* v. 29, Oct. 1950, p. 529s-530s.

Discussion by F. J. Windsor of paper by L. J. McGeady and R. D. Stout (May issue, item 308-K). Includes authors' reply. (K9, CN)

654-K. Electrode Tip Life in Spot Welding Galvanized Steel. Frank W. McBee, Jr. *Welding Journal,* v. 29, Oct. 1950, p. 531s-535s.

Effect of a long series of spot welds upon the electrode tip and weld characteristics. (K3, CN, Zn)

655-K. New Techniques Added to Pressure Welding. *Iron Age,* v. 166, Oct. 26, 1950, p. 58-60.

New types of cold welds developed by Koldweld Corp. which overcome objections to old methods. Dissimilar metals can now be more conveniently welded, and cold welding methods of joining very thin sheets have been improved. Applications described are to Al and Cu. (K5, Al, Cu)

656-K. 242-Gun Welder Speeds Auto Assembly. *Steel,* v. 127, Oct. 30, 1950, p. 58.

Equipment used in manufacture of "Henry J." (K3, T21)

657-K. Mash Resistance Welding Produces Flat Seams in Steel. O. Broner. *Materials & Methods,* v. 32, Oct. 1950, p. 77-78.

Technique and applications. (K3, CN)

658-K. Stud Welding Speeds Steel Production. Robert C. Singleton. *Iron and Steel Engineer,* v. 27, Oct. 1950, p. 100-104.

Use in steel-plant maintenance work of openhearth doors, wet skid tubes, openhearth burners, and crane rails. (K1, D2, ST)

659-K. Versatility and Low Cost Through Arc Welding. *Sheet Metal Worker,* v. 42, Oct. 1950, p. 60-61.

Use of arc welded jigs and fixtures in the fabrication of 18 and 20-gage metals into electrostatic cleaning equipment, at Trion, Inc. (K1)

660-K. Rapid Testing of Weld Strengths. *Chemical Age,* v. 63, Sept. 30, 1950, p. 467-468.

Servo-controlled pulsation-pressure equipment for testing welds in pressure vessels, which is in use in the new laboratory of British Welding Research Association. (K9)

661-K. Ultrasonic Soldering of Aluminium. B. E. Noltingk and E. A. Neppiras. *Nature,* v. 166, Oct. 7, 1950, p. 615.

For some years it has been known that it is possible to tin aluminum and its alloys by subjecting their surface to the action of ultrasonic vibration at the same time as molten solder is applied. It has now been established that the process is one of removing the oxide skin by cavitation erosion. (K7, Al)

662-K. Architectural Metalwork. Colin Spencer. *Welding,* v. 18, Oct. 1950, p. 418-425.

Required welding techniques. Widely varying examples of this type of craftsmanship as practiced in Britain. (K general, T26, CN)

663-K. The Automatic Flash Welding Machine. A. G. Galle and C. A. Burton. *Welding,* v. 18, Oct. 1950, p. 437-441.

Principles of operation together with the latest design developments. Tables are provided for determining correct machine settings. (K3)

664-K. Stud Welding With "Stored Energy". Development of the Graham Process. K. S. Estlin. *Welding,* v. 18, Oct. 1950, p. 446-448.

Equipment and procedures. (K1)

665-K. Welded Power Plant; A Visit to W. H. Allen, Sons & Co., Ltd. (Concluded.) *Welding,* v. 18, Oct. 1950, p. 449-453.

Summary of a lecture on mild steel arc weld testing procedures of above company, given by R. T. Rolfe. (K1, CN)

666-K. Manufacturing Chains by Means of Electric Resistance Welding. (In German.) W. Pungel. *Schweissen und Schneiden,* v. 2, Aug. 1950, p. 216-220.

Methods used by different firms. Advantages over forged chains. (K3, T7, CN)

667-K. Hints for Welding Common Metals. *American Machinist,* v. 94, Oct. 30, 1950, p. 127, 129.

A tabular presentation applying to oxy-acetylene welding. (K2)

668-K. Oil Power Boosts Welding Production 300 Percent. Willard C. Gunzelman and Charles H. Hallett. *Applied Hydraulics,* v. 3, Nov. 1950, p. 17-19.

Special hydraulically operated welding equipment for production of steel combine rasp bars (agricultural equipment). (K general, T3)

669-K. Further Developments in the Koldweld Process. *Light Metal Age,* v. 8, Oct. 1950, p. 16-19.

Recent applications to Al and Cu. (K5, Cu, Al)

670-K. Plug Welding Shortcuts Jacketed Vessel Production. *Steel,* v. 127, Nov. 6, 1950, p. 89.

How pressure jackets are fastened to the inside liners of stainless process vats by a fast semi-automatic plug welding method. (K1, SS)

671-K. Design and Installation of Large-Diameter Long-Span Welded Pipe. H. Jackson. *Welding Journal,* v. 29, Nov. 1950, p. 957-961.

Use of rigid ring girders at points of support to prevent distortion throughout the length of the span. Field erection and welding methods. (K1, CN)

672-K. Spot Welder Secondary Current Measurement. I. C. McKechnie. *Welding Journal,* v. 29, Nov. 1950, p. 962-964.

New method and its "repeat accuracy" (variability at a given control setting). Formulas for determining weldabilities of various materials, and for calculating currents, times, and pressures required for specific welds. (K3)

673-K. Spot and Seam Welding of Aircraft Using D.C. Current. J. H. Cooper. *Welding Journal,* v. 29, Nov. 1950, p. 965-972.

Field performance of "Tri-phase" dry-disc-rectifier d.c. welders in a number of high-production installations for Al alloys, stainless steels, Ni alloys, and carbon steels. Case histories from nine companies. (K3, CN, SS, Al, Ni)

674-K. Reclamation of Diesel Locomotive Parts. La Motte Grover and R. L. Rex. *Welding Journal,* v. 29, Nov. 1950, p. 973-980.

Miscellaneous repair and maintenance welding jobs on ferrous and nonferrous parts using arc welding, inert-gas shielded arc, and gas welding. Also hard facing. (K1, K2, L24, T23)

675-K. Automatic Welding in Steel Mill Maintenance. William P. Hoffman. *Welding Journal,* v. 29, Nov. 1950, p. 989-994.

Various examples at Wisconsin Steel Div., International Harvester Co., Chicago. (K1, A5, ST)

676-K. Welding of Farm Tractors. J. Leonard Buchholz. *Welding Journal,* v. 29, Nov. 1950, p. 995-1000.

Practically every welding process for steel and gray iron is used. Redesign of parts to welded construction. (K general, T3, ST, CI)

677-K. Cast Iron Repair. A. J. Beldon. *Welding Journal,* v. 29, Nov. 1950, p. 1001.

How a large cast iron mill was repaired by fusion welding with cast iron rod. It would have been easier to repair it by bronze welding, but in service the mill holds cyanide solutions that would attack a bronze weld. (K2, CI)

678-K. Welding in the Oil Fields. *Welding Journal,* v. 29, Nov. 1950, p. 1002-1004.

Miscellaneous equipment and applications. (K general, T28)

679-K. Diesel Manifolds Economically Repaired. *Welding Journal,* v. 29, Nov. 1950, p. 1004.

Use of inert-gas shielded-arc welding. (K1, CN)

680-K. Effect of Welding on the Properties of Titanium-Carbon Alloys. E. M. Mahla and R. B. Hitchcock. *Welding Journal,* v. 29, Nov. 1950, p. 544s-551s.

The inert-gas shielded tungsten-arc process was found to be satisfactory for welding Ti-C alloys. 0.25% C is the maximum permissible for ductile welds in the as-welded condition. Bend, tensile, and corrosion-test data, as well as results of metallographic studies. (K1, Q general, Ti, C-n)

681-K. Welding Air-Hardening Alloy Steels. Walter H. Wooding. *Welding Journal,* v. 29, Nov. 1950, p. 552s-564s.

Investigation of various procedures for shielded metal-arc welding of an air-hardening alloy steel indicated that isothermal transformation characteristics of the heat-affected zone considerably influenced weldability of the material under high restraint. Above the temperature at which the martensite transformation begins, the heat-affected zone is very sensitive to thermal shock and prone to underweld cracking. This cracking persists until the bainite transformation approximates 8%. Heat-affected zones exhibiting partial martensite transformation are likewise sensitive to underweld cracking unless tempered prior to thermal shock. Effect of preheat upon cooling rates. (K1, K9, N8, AY)

682-K. How a Zinc Smelter Utilizes Welding for Maintenance and Fabrication. Harold Hodnick and Jack Meredith. *Industry & Welding,* v. 23, Nov. 1950, p. 22-23, 64-65.

Arc welding, flame cutting, gas welding, lead burning, etc. (K general)

683-K. Design Analysis of a Large Weldment. L. G. Hauser. *Industry & Welding,* v. 23, Nov. 1950, p. 26-28, 50-51.

As applied to the rotor spider of a hydro-electric generator. Materials are SAE 1015 and 1035. (K general, T25, CN)

684-K. Machine Welding in the Field. William R. Harper. *Petroleum Engineer,* v. 22, Nov. 1950, p. D36-D38.

Equipment and procedure for welding sections of pipeline together in the field. An internal clamp holds 30-in. o.d. pipe in position while it is rotated under the welding head. (K1, CN)

685-K. Stud Welding Cuts Costs in Tractor Handle Assembly. *Product Engineering,* v. 21, Nov. 1950, p. 101. (K1)

686-K. A Nickel-Chromium-Iron Alloy for Sealing to Glass. J. E. Stanworth. *Journal of Scientific Instruments,* v. 27, Oct. 1950, p. 282-284.

Development of alloy containing 47% Ni and 5% Cr and matching ordinary lead glass as used in manufacture of electrical lamps and tubes. Stresses in seals made with this material are low at all temperatures. (K11, T1, Ni, Fe)

687-K. Strato Ships Spot Welded. Howard E. Jackson. *Welding Engineer,* v. 35, Nov. 1950, p. 17-19.

Procedures at Boeing. Includes surface cleaning procedures. (K3, L12, Al)

688-K. Inert-Arc Welding of Everdur Beer Filter. A. C. Kracklauer. *Welding Engineer,* v. 35, Nov. 1950, p. 26-28. (K1, Cu)

689-K. All-Aluminum Guard Rail. J. I. Medoff. *Welding Engineer,* v. 35, Nov. 1950, p. 29.

Weld fabrication of rail for a Philadelphia highway bridge from 61S-W Al alloy. (K1, T26, Al)

690-K. Building a Kurtis-Kraft Sportscar. James Joseph. *Welding Engineer,* v. 35, Nov. 1950, p. 30-31.

Use of arc and spot welding in production of racing-car bodies. (K1, K3, T21, CN)

691-K. How Britain Uses Stud Welding. Fred Brewster. *Welding Engineer,* v. 35, Nov. 1950, p. 32-33, 37.

How Cyc-Arc process operates and its applications to ferrous and nonferrous compounds. (K1)

692-K. 10 Jobs in the Oil Fields. Elton Sterrett. *Welding Engineer,* v. 35, Nov. 1950, p. 34-37.

Ten maintenance and construction jobs for which welding is used. (K general, T28)

693-K. Trade Names of Electrodes and Comparable AWS-ASTM Designations. *Welding Engineer,* v. 35, Nov. 1950, p. 49.

A table. (K1, T5)

694-K. Some Aspects of Metallic Arc Welding of Sheet Metal. A. G. Thompson. *Sheet Metal Industries,* v. 27, Oct. 1950, p. 879-883.

Equipment, welding conditions, design for sheet-metal work, fit-up and jigging, electrodes, and procedures. (K1)

695-K. Joining Nimonic. *Aircraft Production,* v. 12, Sept.-Oct. 1950, p. 265-269.

The Wiggin series of high-Ni alloys, and recommended procedure for soldering, brazing, and welding. (K general, Ni)

696-K. Basic Principles of Arc Welding. Rolt Hammond. *Machinery Lloyd*

(Overseas Edition), v. 22, Oct. 14, 1950, p. 68-71, 73, 75.
Clarified by diagrams. (K1)

697-K. Effect of Cooling Rate and Composition on the Embrittlement of Weld Metal. E. C. Rollason and R. R. Roberts. *Journal of the Iron and Steel Institute*, v. 166, Oct. 1950, p. 105-112.
Tensile specimens of extremely rapidly cooled (e.g. 1400° C. per min.) mild steel weld metal have low ductility associated with woody fractures. In welds with high hydrogen content, microfissures similar to hairline cracks were also found, and these prevent complete recovery of ductility by tempering at 650° C. Extent of fissuring was shown to be related to H_2 and N_2 contents of the weld. Suggests that fissuring is caused by the embrittling effect of H_2 on regions of the weld already reduced in ductility by the presence of C and N_2-rich intermediate transformation products of austenite. A study was made of effects on fissuring and N_2 solubility of alloy additions to weld metal. (K9, Q23, CN)

698-K. Welding of Aluminium Alloys. G. S. Misra. *Transactions of the Indian Institute of Metals*, v. 1, Apr. 1949, p. 249-295; discussion, p. 296.
The different methods of welding Al and its alloys. Metallurgical characteristics which influence the welding procedure. Applications and methods of gas, flame, and electric welding as well as cold and pressure welding. Differences between welding techniques for steel and Al. 24 ref. (K general, Al)

699-K. Gray Iron: Welding; Joining; Cutting. C. O. Burgess. *American Foundryman*, v. 18, Oct. 1950, p. 50-57; Nov. 1950, p. 44-48.
Elevated temperature methods of welding, joining, and cutting gray iron. Material will constitute Chapter VII of the "Gray Iron Handbook". (To be continued.) (K general, CI)

700-K. Hints on How To Weld Sheet Lead. *Power Engineering*, v. 54, Nov. 1950, p. 82-83.
(K general, Pb)

701-K. A Survey of Aluminum Welding Techniques. (Concluded.) Floyd A. Lewis. *Tool Engineer*, v. 25, Nov. 1950, p. 28-31.
Gas-shielded arc welding, carbon-arc welding, atomic-hydrogen welding, seam welding, and flash welding. (K1, K3, Al)

702-K. Simulated Test Conditions Eliminate Brazing Defects. *Steel*, v. 127, Nov. 20, 1950, p. 99.
Simple test for brazability of cupro-nickel. During casting of each heat, a test coupon is taken. This sample is rolled to a thinner gage, then held in a tube furnace for 15 min. at 2050° F., duplicating conditions of actual brazing. A bright surface after this treatment indicates good brazability. (K8, Cu)

703-K. Welding Quality Control in a Petroleum Refinery. A. F. Blumer. *Petroleum Refiner*, v. 29, Nov. 1950, p. 101-108.
Welding quality control consists of qualification testing of welders, continued sampling and welding inspection on jobs in progress, testing and selection of suitable electrodes, adherence to welding procedures and job specifications, and evaluation and use of new developments in welding. (K general, S general)

704-K. How To Control Welding Quality. A. F. Blumer. *Petroleum Processing*, v. 5, Nov. 1950, p. 1192-1195. (A condensation.)
See preceding abstract, item 703-K. (K general, S general)

705-K. The Design and Fabrication of Welded Structures Subjected to Repeated Loading. Part V. R. Weck. *Welder*, v. 19, Apr.-June 1950, p. 43-46.
Fatigue strength of riveted joints and the effect of single beads of weld metal on the fatigue strength of plate materials. References to recent literature. (To be continued.) (K general, Q7, CN)

706-K. Physical Aspects of Weldability of Glass to Metal in the Electron-Tube Industry. I. The Problem of Weldability of Glass to Metal From the Physical Point of View. II. Determination of Optimum Annealing Cycles for Glass Alone and for Glass-Metal Bonds. (In French.) Georges Trébuchon and Jacques Kieffer. *Verres et Réfractaires*, v. 4, June 1950, p. 135-157; Aug. 1950, p. 230-247.
Phenomena producing stresses at different temperatures of the surrounding atmosphere in the glass-metal bond were investigated. Experimental methods and the theoretical interpretation of such phenomena. 18 ref. (To be continued.) (K11)

707-K. Welding and Brazing of Monel, Nickel, and Inconel. (In French.) A. Boutté. *Soudure et Techniques Connexes*, v. 4, Jan.-Feb. 1950, p. 29-32; Mar.-Apr. 1950, p. 76-80; May-June 1950, p. 119-125; July-Aug. 1950, p.159-164.
A comprehensive survey of modern methods. Theoretical bases of each process. Optimum conditions for individual methods of welding and brazing and spheres of application. (K general, Ni)

708-K. Contribution to the Study of Welding Torches. (In French.) H. Lagarde. *Soudure et Techniques Connexes*, v. 4, July-Aug. 1950, p. 149-158; discussion, p. 158.
Different types used for oxy-acetylene welding. Factors influencing operation, including material used for different components of the torch. (K2, T5)

709-K. Furnace Brazing. (In French.) A. Normand. *Soudure et Techniques Connexes*, v. 4, July-Aug. 1950, p. 165-166.
Method is particularly applicable for the rapid joining of relatively lightweight components, the size of which permits heating in a furnace. Optimum conditions of operation. (K8)

710-K. Concerning the Quality of Welds Obtained by Automatic Welding Under Winter Conditions. (In Russian.) B. I. Medov and A. E. Asnis. *Avtogennoe Delo* (Welding), v. 21, Aug. 1950, p. 1-8.
Investigated for low-carbon steel of ordinary thicknesses. It was found that impact strength and brittleness under winter conditions are essentially the same as under standard conditions. Probability of formation of pores and cracks increases due to increase of rate of cooling. Conditions under which welding at freezing temperatures is permissable were determined. (K1, CN)

711-K. Mechanization of Assembly-Welding Operations in the Production of All-Metal Automobile Bodies. (In Russian.) N. A. Chuvakov and V. I. Gorbachev. *Avtogennoe Delo* (Welding), v. 21, Aug. 1950, p. 9-12.
As practiced in the U.S.S.R. (K1, T21, CN)

712-K. Three-Phase Arc-Welding Apparatus. (In Russian.) N. S. Siunov. *Avtogennoe Delo* (Welding), v. 21, Aug. 1950, p. 12-15.
Apparatus with which welding is performed manually. Use of the three-phase arc was found to markedly increase the productivity, simplify the technique, improve the quality of the work, and save 20-25% on power. Operating characteristics. (K1)

713-K. Welding Under Flux of Parts Having a Complex Shape. (In Russian.) Ya. A. Zav'yalov. M. S. Khatsko, and V. I. Makhanev. *Avtogennoe Delo* (Welding), v. 21, Aug. 1950, p. 15-17.
Welding 3-4 mm. sheets of low-carbon steel. Details of technique for a series of examples. A semi-automatic apparatus was used. (K1, CN)

714-K. Application of Electrical Heating for Hard Soldering. (In Russian.) L. V. Glebov and S. V. Livshits. *Avtogennoe Delo* (Welding), v. 21, Aug. 1950, p. 24.
A method of electrically heating parts to be soldered to improve quality of the joints obtained. Special applications of the method. (K7)

715-K. Electrodes for Welding Structural Steels. (In Russian.) S. K. Zveg'intsev and E. A. Sirota. *Avtogennoe Delo* (Welding), v. 21, Aug. 1950, p. 25-27.
Characteristics of four electrodes used for welding low-alloy structural steels. Basic characteristics of the compositions are use of basic coatings containing marble, fluorspar, etc., as slag formers; presence of ferro-alloys (ferrosilicon, ferromanganese, ferrotitanium) of the fused metal; and low content of harmful impurities (sulfur and phosphorus). Welding characteristics of individual electrodes. (K1, T5, CN)

716-K. (Book) **Procedure Handbook of Arc-Welding Design and Practice.** Ed. 9. 1200 pages. 1950. Lincoln Electric Co., 12818 Coit Rd., Cleveland. $2.00.
Completely reorganized and re-edited. Latest procedures for welding all metals and alloys commonly welded with manual open-arc and hidden-arc welding, as well as automatic and semi-automatic hidden-arc welding. A new chapter on weldability. Facts revealed by research projects and recent studies. (K1)

717-K. (Book) **Manuel de Soudure Electrique a l'Arc.** (Manual for Electric-Arc Welding). Ed. 3. Ed. Henrion and F. M. L. Van Horenbeeck. 174 pages. 1948. Desoir, Liege, Belgium.
Theoretical basis presented in popular form. Methods and techniques; problems and test methods. (K1)

718-K. (Book) **Die Grauguss-Gasschweissung leicht gemacht.** (Gas Welding of Grey Cast Iron Made Easy). F. Wuttke. 89 pages. Carl Marhold Verlagsbuchhandlung, Halle-saale, Germany. 6.75 DM.
Essentially a practical repair manual. Deals with the detection of cracks, preparation of the weld area, preheating methods, and recommended welding techniques. (K2, CI)

L CLEANING, COATING AND FINISHING

753-L. Mica-Base Paint System Doubles Transformer Tank Life. J. G. Ford and A. J. Kuti. *Steel*, v. 127, Oct. 30, 1950, p. 56-58.
Three-coat baking-type finish developed for distribution transformers which withstands widely diverse atmospheric conditions. Mica flakes are used in an alkyd-resin vehicle. (L26, ST)

754-L. Elgin Steel Kitchen Cabinets Finished in Conveyorized System. *Industrial Heating*, v. 17, Oct. 1950, p. 1796-1798, 1802, 1804, 1806-1808. (L26, T10, CN)

755-L. Conveyorized Blasting Unit Provides Economical Cleaning. Victor E. Hillman. *Foundry*, v. 78, Nov. 1950, p. 204, 206. (L10)

756-L. Chromium Is Plated Directly on Aluminum by New Process. T. C. Du Mond. *Materials & Methods,* v. 32, Oct. 1950, p. 56-57.

How wear resistance and antifrictional qualities of many Al parts can be improved by Cr plating. The Al to be plated is wet blasted by an abrasive suspended in water. After being blasted, the surface retains a coating of the suspension thick enough to prevent any action by air, before immersion in the plating bath. (L17, Cr, Al)

757-L. Research Shows How Pickling Causes Brittleness in Stainless Steels. Carl A. Zapffe. *Materials & Methods,* v. 32, Oct. 1950, p. 58-62.

Reviews fundamental studies on the behavior of gases in steel which have resulted in a better understanding of the difficulties encountered in pickling and have suggested ways of avoiding failures. (L12, Q23, SS)

758-L. Dow Draws Conclusions From Three-Year Paint Study. Otto K. Sieplein. *Chemical Engineering,* v. 57, Oct. 1950, p. 110-115.

Essential conclusions of 3-year test program conducted by Dow Chemical Co. in cooperation with Sherwin-Williams. Over 1700 specimens were exposed to highly corrosive marine atmospheres containing high concentrations of a wide variety of chemical fumes. Pigments, finish coats, and primers were evaluated. The finishes were applied to sand blasted steel panels or to sand blasted areas of chemical tanks and other equipment. (L26, R3)

759-L. Preparing Metal Surfaces for Painting. Edwin Lacy. *Industrial Finishing,* v. 26, Oct. 1950, p. 24-26, 28.

Application of acid phosphate solutions in automatic mechanical spray-washing machines. (L14, L26)

760-L. Process Development Section of G-M Corporation Saves Thousands. R. J. Emmert. *Machine and Tool Blue Book,* v. 46, Nov. 1950, p. 73-76, 78-79, 82.

Two of the problems solved are shot blasting and shot cleaning, and welding of nuts to sheet metal. In the latter, an automatic feed device is fitted to a standard spot welder. (L10, K3, ST)

761-L. Continuous Observations With the Electron Microscope on the Formation of Evaporated Films of Silver, Gold, and Tin. T. A. McLauchlan, R. S. Sennett, and G. D. Scott. *Canadian Journal of Research,* v. 28, sec. A, Sept. 1950, p. 530-534.

Special specimen holder for evaporation of metals within an RCA-EMU electron microscope, which provides continuous observations on growth of films of metal. Micrographs illustrate formation of the films. Results confirm the usually accepted assumptions regarding formation of nuclei and growth of aggregates. 11 ref. (L25, M21, Ag, Au, Sn)

762-L. German Plating and Finishing Described. *Iron Age,* v. 166, Nov. 2, 1950, p. 98. Based on paper by R. Springer.

Developments in Germany during 1940-1950. (L general)

763-L. Test of Bonded Bi-Metallic Piston. *SAE Journal,* v. 58, Nov. 1950, p. 80. Based on "Bi-Metallic Pistons", by Charles E. Stevens, Jr.

The problem of making a bonded bi-metallic piston, or an Al piston having a ferrous member cast and bonded in place to receive one or more ring grooves, has been one of developing a technique which would permit the casting to cool to room temperature without bond failure. A solution to this problem was reached by using high-Ni cast irons having a high coefficient of expansion. Comparison of an all-Al piston shows that ring groove wear is greatly reduced by use of a ferrous insert. (L22, T7, CI, Al)

764-L. Zinc Plating for Corrosion Resistance and Decorative Purposes. S. R. Goodwin. *Electroplating and Metal Finishing,* v. 3, Oct. 1950, p. 524-528.

Protective value of electrodeposited zinc, preparation of base metal, zinc plating solutions, bright zinc solutions, and corrosion resistance of bright zinc. (L17, R general, Zn)

765-L. Intrinsic Porosity. Part Two. *Electroplating and Metal Finishing,* v. 3, Oct. 1950, p. 529-530.

In the first part it was shown that extremely fine porosity is inevitable in a very thin electrodeposit. This installment: Use of addition agents and water-displacing fluids and effect on porosity of plating conditions. (L17)

766-L. Notes on the Drying of Plated Components. C. D. Leonard. *Electroplating and Metal Finishing,* v. 3, Sept. 1950, p. 483-486; Oct. 1950, p. 531-534.

Drying with sawdust, centrifugal drying, and use of water-displacing fluids. Practical hints. (L17)

767-L. Nickel Plated Wire Now Can Be Cold Drawn. *Steel,* v. 127, Nov. 6, 1950, p. 86.

New development of Kenmore Metals Corp., Jersey City, N. J. Ni is plated directly on the steel wire without any intermediary deposit. Thickness of the coating may be as high as 0.002 or 0.003 in. The plating has no adverse effect on the drawing process. Ni has also been plated on Cu wire and on Dumet, a 42% Ni iron wire. Applications are cited. (L17, T general, Ni, CN, Cu, Fe)

768-L. The Application of Marine Paints to Exterior Steel. Rick Mansell. *Organic Finishing,* v. 11, Oct. 1950, p. 15-18.

Recommended procedures for application to various ship surfaces. Paint compositions, including those for antifouling. (L26, T22, CN)

769-L. Kawneer Enamels Aluminum for Profit. *Ceramic Industry,* v. 55, Nov. 1950, p. 54-57, 113.

Details of process and equipment. Unsolved problems include warpage and need for extreme care in metal pickling. (L26, Al)

770-L. A 72-Inch High Vacuum Evaporator and Its Glow Discharge Equipment. Nels C. Benson, Georg Hass, and Noel W. Scott. *Journal of the Optical Society of America,* v. 40, Oct. 1950, p. 687-690.

Evaporator constructed primarily for applying SiO-protected Al coatings to 60-in. searchlight reflectors. Studies made to determine optimum shape, size, and position of the glow-discharge cathode for obtaining uniform heating and consequent cleaning of mirror forms. (L25, Al)

771-L. The Potential for the Hot-Spray Lacquer Process. J. B. Wiesel. *American Paint Journal,* v. 35, Nov. 13, 1950, p. 58, 60, 62. (L26)

772-L. Ductile, Mirror-Bright Copper Plate From Acid Sulfate Baths. Part I. Initial Research and Brightener Preparation. C. J. Slunder, A. E. Bearse, and C. L. Faust. *Plating,* v. 37, Oct. 1950, p. 1040-1044, 1060.

Patents of Henricks and of Beaver on use of organic sulfonation products in acid sulfate baths for production of bright, ductile Cu. Experimental work which was done to define the specific composition and operating conditions for reproducing the Henricks-type bright plating operation. Use of a series of related compounds as brighteners was investigated. (L17, Cu)

773-L. Production Barrel Plating With Nickel Fluoborate Solution. R. J. O'Connor. *Plating,* v. 37, Oct. 1950, p. 1045-1046, 1056.

Results of production tests on above solution, previously investigated on a laboratory basis. Numerous advantages were confirmed. (L17, Ni)

774-L. Plating With Rhodium and Palladium. Karl Schumpelt. *Plating,* v. 37, Oct. 1950, p. 1052-1056.

Correlates literature. Preparation and composition of solutions, plating conditions, and methods of bath analysis. 27 ref. (L17, Rh, Pt)

775-L. Specifications for Electrodeposited Coatings; Their Purposes and Importance. Clarence H. Sample. *Plating,* v. 37, Nov. 1950, p. 1140-1142.

Types of specifications and importance of tests, early uses of specifications, ASTM-AES specifications, and other specifications. 25 ref. (L17, S22)

776-L. Polishing and Buffing. James H. Lindsey. *Plating,* v. 37, Nov. 1950, p. 1143-1148.

Review of articles and papers published during 1944-1948. Every effort was made to avoid modification or editing of the opinions expressed by the authors. Manufacturers' literature is excluded. 60 ref. (L10)

777-L. Ductile, Mirror-Bright Copper Plate From Acid Sulfate Baths. Part II. Pilot-Plant Operation and Application. Wm. H. Safranek, E. L. Combs, and C. L. Faust. *Plating,* v. 37, Nov. 1950, p. 1149-1152, 1161.

Application of the three individual addition agents described in Part I to bright and semibright plating. Practicable control methods based on data obtained during pilot-plant operation. The procedures are adaptable to commercial plating of bright copper having mirrorlike color and heretofore unequalled properties. Savings are visualized by bright Cu plating before bright Ni plating. (L17, Cu)

778-L. Effect of Impurities and Purification of Electroplating Solutions. I. Nickel Solutions. 4. The Effects and Removal of Copper. D. T. Ewing, Robert J. Rominski, and William M. King. *Plating,* v. 37, Nov. 1950, p. 1157-1160.

Data show the resulting change in certain physical properties of the electrodeposited nickel. (L17, Ni)

779-L. Unique Conception of Job Enameling Plant. Walter Rudolph. *Products Finishing,* v. 15, Nov. 1950, p. 14-18, 20, 22.

Equipment and procedures of Ervite Corp., Erie, Pa. Unique aspects are mainly in materials handling. (L27, ST)

780-L. Practical Notes on Decorative Chromium Plating. Jerome L. Bleiweis. *Products Finishing,* v. 15, Nov. 1950, p. 24, 26, 28, 30, 32, 34, 36.

Some of the problems usually encountered, and precautions to be observed, as well as steps to eliminate the difficulties. (L17, Cr)

781-L. Modern Masking Materials and Methods for Fabrication and Spray Finishing. (Concluded.) **Part IV. Liquid Masking Materials and Peelable Plastic Coatings.** Arthur P. Schulze. *Products Finishing,* v. 15, Nov. 1950, p. 44-55, 58-60, 62.

21 references. (L26)

782-L. Spotlighting Finishing Progress. Allen G. Gray. *Products Finishing,* v. 15, Nov. 1950, p. 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88.

Extensive summaries of two papers. First, "High Temperature Heat Resistant Coatings", by R. A. Williams, I. H. Lutz, and W. H. Hayne: Development of compositions which are capable of withstanding prolonged exposure to temperatures above 800° F. The primer coat contains Zn, Al, and Cd dispersed in phenolic varnish; the finish coat contains Al, a silicone, and glyceryl

phthalate. Single-coat blue and olive-drab coatings for stainless steel were also developed. Second paper, "Metal Cleaner Efficiency", by Edwin C. Rinker: Recommended procedures for selection of equipment and cleaning solutions; tests for evaluation of the solutions. (L14, L12)

783-L. On the Principles of Electrodeposition of Metal Powders. G. Wranglen. *Engineers' Digest,* v. 11, Oct. 1950, p. 355-358, 372.

Previously abstracted from *Transactions of the Royal Institute of Technology.* See item 573-L, 1950. (L17, Cd, Cu, Fe, Ni, Zn)

784-L. Plating Experiments With Aqueous Solutions at High Temperatures. Seymour Senderoff and Abner Brenner. *Journal of the Electrochemical Society,* v. 97, Nov. 1950, p. 361-366.

Aqueous solutions of salts of Cr, Cu, Mo, Ni, Ti, W, V, and Zr were electrolyzed under pressure at temperatures up to 300° C. Under these conditions, intermediate reduction steps were favored over reduction to metal. Instability of the solutions was frequently encountered but anodic processes were improved in some instances. (L17, L19)

785-L. Finishing Operations on Springs. *Machinery* (London), v. 77, July 13, 1950, Supplementary issue, p. 61-67 (Date on cover: Sept. 28, 1950.)

Problems involved in the finishing of springs. Methods of finishing both steel and nonferrous metal springs similar to those used for other metal components. Use of pre-coated wire, electroplating, hydrogen embrittlement, phosphate treatments, shot peening, and design of springs in relation to subsequent finishing. (L general, G23, T7)

786-L. Plating by Vacuum Evaporation. J. Lomas. *Machinery Lloyd* (Overseas Edition), v. 22, Oct. 14, 1950, p. 87-89, 91.

The process and its applications. (L25)

787-L. A New Way To Metallize. H. N. Acker. *Canadian Metals,* v. 13, Oct. 1950, p. 38, 48.

Schori gun process and applications. (L23, T general)

788-L. On the Capacity of Porous Aluminum Oxide Layers. A. J. Dekker and Helen M. A. Urquhart. *Canadian Journal of Research,* v. 28, sec. B, Sept. 1950, p. 541-550.

Porous Al_2O_3 layers may be obtained by anodic oxidation in H_2SO_4. The base of the pores is separated from the metal by a thin insulating barrier layer. Experiments show that ultimate thickness of this layer remains constant after a critical value has been reached. Dependence of final thickness on current density, concentration, and temperature. 12 ref. (L19, Al)

789-L. Anodised Aluminium. C. M. Daftary. *Transactions of the Indian Institute of Metals,* v. 1, Apr. 1949, p. 175-178; discussion, p. 178-179.

Anodizing process for protecting Al alloys against corrosion. (L19, Al)

790-L. . Maintenance by Welding. M. Riddihough. *Transactions of the Indian Institute of Metals,* v. 3, 1949, p. 347-357.

Equipment, procedures, and applications. New hard facing alloy compositions. 19 ref. (L24, SG-m)

791-L. German Standards: Phosphating Steel Parts as a Protection Against Corrosion. Directions. (In German.) *Metalloberfläche,* sec. A, v. 4, Sept. 1950, p. 137-140.

Specifications, applications, and processes of phosphating. Testing of articles before and after they are bonderized. (L14, ST)

792-L. Porosity of Galvanic Deposits. (In German.) Richard Erdmann. *Metalloberfläche,* sec. B, v. 2, Sept. 1950, p. 138-140.

Causes, and methods of correcting this defect. (L17)

793-L. Problems in the Technique of Metal Spraying. (In German.) Püschel. *Metalloberfläche,* sec. A, v. 4, Sept. 1950, p. 141-143.

Equipment, materials, protective gases, applications, and repair of worn parts by the metal-spraying process. Special uses of this process which are still in the experimental stage. (L23)

794-L. The Metallurgy of Metal Spraying. (In German.) K. Krekeler. *Metalloberfläche,* sec. A, v. 4, Oct. 1950, p. 151-153.

Equipment and procedure. Photomicrographs show the structures of sprayed metals. Some of their properties. (L23)

795-L. Hard-Surfacing for Aluminum Suggests New Uses for Die Castings. *Die Castings,* v. 8, Nov. 1950, p. 33-34, 40.

MHC process (electrochemical) applied to Al and Al alloys. Use on die castings to provide numerous new applications. (L19, Al)

796-L. Precious Metal Plated Finishes for Die Castings. *Die Castings,* v. 8, Nov. 1950, p. 45-47, 66-68.

Emphasis is on gold plating, although Ag and Rh are also mentioned. Bath compositions are given. (L17, Au, EG-c)

797-L. Blast Cleaning of Forgings Reduces Stream Pollution. Joseph Geschelin. *Automotive Industries,* v. 103, Nov. 15, 1950, p. 48-49, 106.

How use of the Pangborn "Continuous-Flo" Rotoblast machine at Buick has fitted into the current program of reducing stream pollution, by accompanying reduction in the amount of pickling waste. Illustrated. (L10, ST)

798-L. Tin-Zinc Alloy Can Replace Cadmium. *Steel,* v. 127, Nov. 20, 1950, p. 118, 120.

A whole range of tin-zinc alloys can be electrodeposited, but the most desirable one appears to be 80% Sn, 20% Zn, with a tolerance of about 2.5% either way. The plating process and properties of the deposit. (L17, Sn)

799-L. European Trends in General Galvanising; An Outline of Development Work. R. Lewis Stubbs and A. R. L. Chivers. *Metallurgia,* v. 42, Oct. 1950, p. 233-234. (L16, Zn, CN)

800-L. The Electrolytic Polishing of Zirconium and Its Application to a Study of the Effects of Abrasion Upon the Structure of the Metal. P. A. Jacquet. *Metallurgia,* v. 42, Oct. 1950, p. 268-270.

Technique and results. Includes photomicrographs. (L13, M27, Zr)

801-L. Vapor Deposition of Uniform Thin Layers of Controlled Thickness; Electronic Applications. (In French.) Ch. Dufour. *Vide,* v. 5, July-Sept. 1950, p. 837-843.

Method and apparatus developed by a French television laboratory which permits vacuum deposition of uniform (±1% of desired composition) layers of a thickness as low as 1/50th micron. It is applicable to deposition of both metallic and nonmetallic materials. Various applications. (L25, T1)

802-L. Properties of Metals Deposited by Gun Spraying in Thick Layers. (In French.) J. Grilliat. *Métaux et Industries,* v. 1, no. 1, 1950, p. 14-23.

Physical, chemical, mechanical and structural properties of spray-deposited steel, Cu, bronze, brass, Al, light alloys, Zn, Pb, and their alloys. Deviations of properties from those of the corresponding base metals (cast or hot or cold worked). Photomicrographs and a Debye-Scherrer pattern illustrate structures. (L23, Q general, P general, M27)

803-L. The Participation of Chromium Chloride and Hydrogen in Chromium Plating by Vapor Deposition. (In Russian.) N. G. Klyuchnikov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Sept. 11, 1950, p. 267-269.

During the above method of Cr plating, the chloride is always present in the bivalent state and the plating operation may be performed in an atmosphere of chromium chloride in the absence of ferrochromium. Hydrogen dissolved in the metal also participates in plating process and in some cases increases as much as 5-10 times the absorption of Cr by the base metal. (L25, Cr)

804-L. Electrochemical Method for Determination of Adhesivity of Electrodeposits. (In Russian.) A. T. Vagramyan and Yu. S. Tsareva. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Sept. 11, 1950, p. 303-305.

Method is based on determination of the value of cathodic polarization during the electrodeposition process and establishment of a relationship between the minimum value of polarization for the case of an absolutely pure electrolyte and a very clean cathode surface, and adherence of the deposit. Comparison of data from the bending test with the new test shows close agreement. (L17)

805-L. (Book) Metallische Ueberzeuge (Metallic Coatings). Ed. 3. W. Machu. 672 pages. 1948. Akademische Verlagsgesellschaft Geest & Portig K. G., Leipzig, Germany. £3, 10s.

The standard German work on metallic films as applied by various methods. Deals with practically all the metals, and includes data on testing methods. A large number of references as well as a name and subject index are included. (L general)

M

METALLOGRAPHY, CONSTITUTION AND PRIMARY STRUCTURES

321-M. Single Crystal Copper Surfaces. T. N. Rhodin, Jr. *Journal of Applied Physics,* v. 21, Oct. 1950, p. 971-973.

Some surface-structure characteristics of a metal single crystal and the preparation of single-crystal Cu plates. Using physical micro-adsorption isotherm of nitrogen at 78.1° K., electron diffraction, and X-ray diffraction methods, the conclusion is tentatively made that the surfaces are essentially planar on a molecular scale, and that the surface atoms are arranged in an approximately undistorted lattice. (M26, Cu)

322-M. Single Wave-Length X-Rays for Powder Diffraction. L. K. Frevel and P. P. North. *Journal of Applied Physics,* v. 21, Oct. 1950, p. 1038-1039.

Shows that WLα radiation filtered through a Cu-Zn foil is essentially monochromatic and has the advantage over filtered CuKα or MoKα radiation in that the WLα_1 line is approximately ten times as intense as the WLα_2 line. Moreover, the comparatively wide $\Delta\lambda$ = spread (WLα_2 = WLα_1) results in very sharp powder lines at those Bragg angles where the CuKα doublet or MoKα doublet is unresolved. (M22)

323-M. Electron Microradiography of Electrodeposited Metals. Rolf Weil and Harold J. Read. *Journal of Applied Physics*, v. 21, Oct. 1950, p. 1068.

New method of examining specimens directly in the electron microscope without the aid of replicas. This method was most valuable in study of the initiation of plating, revealing some features not seen when conventional techniques are employed. It should also be a useful tool in the study of other metallurgical phenomena. (M21)

324-M. Apparatus for Cutting Metals Strain-Free. Robert Maddin and W. R. Asher. *Review of Scientific Instruments*, v. 21, Oct. 1950, p. 881-883.

Apparatus, in which cutting is accomplished by chemical attack (HNO_3). It is useful in cutting single crystals for basic research. (M23)

325-M. Relationship of Distribution of Inclusions in Forged Steel to Macrographic and Micrographic Structure. (In French.) P. Cattier, Ch. Dubois, J. Bleton, and P. Bastien. *Revue de Metallurgie*, v. 47, Aug. 1950, p. 619-635; discussion, p. 635-636.

See abstract of "Distribution of Inclusions in Forged Steel", *Metal Treatment and Drop Forging*, items 182-M and 270-M, 1950. (M27, M28, D5, AY)

326-M. Determination of Parameters of Beryllium by the Method of Partial Projection. (In Russian.) N. V. Belov and R. G. Matveeva. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, July 11, 1950, p. 299-302.

Bases of the method and its application to determination of crystallographic parameters of Be. The technique of computation using newly developed equations. Obtained data are compared with those determined by other methods. (M26, Be)

327-M. Electron-Microscopic Investigation of the Structure of Palladium Films, Produced on the Surfaces of Water Solutions of Metallic Salts by the Action of Gaseous Reducing Agents. (In Russian.) N. V. Demenev, N. N. Buinov, and M. I. Milyutina. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, Aug. 1, 1950, p. 751-754.

Results are compared with those previously obtained with thin films of Au and Pt. Hydrogen was used as the reducing agent and $PdCl_2$ as the salt. Influence of rate of reduction was particularly important. (M27, M21, Pd)

328-M. A Mechanical X-Ray Structure-Factor Calculating Machine. V. Vand. *Journal of Scientific Instruments*, v. 27, Oct. 1950, p. 257-261.

Machine capable of carrying out calculations for up to 24 atoms. (M23)

329-M. A Simple Machine Capable of Fourier Synthesis Calculation. J. H. Robertson. *Journal of Scientific Instruments*, v. 27, Oct. 1950, p. 276-278.

A machine for one-dimensional Fourier summation such as required in X-ray crystallography. (M22)

330-M. A Small High-Temperature High-Vacuum Furnace. K. B. Alberman. *Journal of Scientific Instruments*, v. 27, Oct. 1950, p. 280-282.

Suitable for heating gram quantities up to 2500° C. under pressures of 10^{-4} to 10^{-5} mm. Hg. (M23)

331-M. The Nature and Uses of Diffraction. A. E. W. Austen and N. Hendry. *Journal of the Electrodepositors' Technical Society*, v. 25, 1950, p. 105-123. (Preprint)

Applications to the identification of composition, structure, crystal size, state of random strain, orientation, and macroscopic strain. Reviews literature on electrodeposited layers, considering nature of the interface, adhesion of deposit, and strain in deposit. 18 ref. (M22, L17)

332-M. On the Phases Occurring in Alloys of Aluminium With Copper, Magnesium, Manganese, Iron, and Silicon. Gosta Phragmen. *Journal of the Institute of Metals*, v. 77, Aug. 1950, p. 489-552.

Studied by microscopic and X-ray crystallographic methods. Results are shown in diagrams for systems of three, four, five, or six components. Colors of the phases in ordinary and polarized light, their etching properties, crystal system, crystal form, unit-cell parameters and in some instances densities. Some information about two phases which do not form eutectics with Al. 67 ref. (M26, Al, Cu, Mg, Mn, Fe, Si)

333-M. The Constitution of Uranium-Molybdenum Alloys. P. C. L. Pfeil. *Journal of the Institute of Metals*, v. 77, Aug. 1950, p. 553-570.

The system was examined using micrographic, X-ray, and thermal-analysis methods. No intermediate phases were recognized. Experimental results, particularly the solid solubility of Mo in the three allotropic modifications of U, are discussed in terms of the general theory of the alloying behavior of U. 10 ref. (M24, Mo, U)

334-M. The Uranium-Iron System. J. D. Grogan. *Journal of the Institute of Metals*, v. 77, Aug. 1950, p. 571-576.

An examination of the uranium end of the U-Fe system and a brief survey of the remainder. (M24, U, Fe)

335-M. An X-Ray Examination of Uranium-Iron Alloys, and a Discussion of the Structure of UFe_2. C. J. Birkett Clews. *Journal of the Institute of Metals*, v. 77, Aug. 1950, p. 577-580.

An appendix to the preceding paper by J. D. Grogan. (See above abstract, item 334-M.) A series of 10 U-Fe alloys was examined. The alloys contained 1-50 weight % Fe. (M26, U, Fe)

336-M. Lattice Parameters of Binary Nickel-Cobalt Alloys. A. Taylor. *Journal of the Institute of Metals*, v. 77, Aug. 1950, p. 585-594.

It was found that Co and Ni are mutually soluble in each other in all proportions. In general, increasing the Co content increases the lattice spacing of face-centered cubic Ni in a non-linear manner, producing an inflection in the spacing/composition curve in the region of Ni_7Co_3, and a second inflection near $NiCo_3$, beyond which point face-centered cubic and hexagonal close-packed forms coexist in randomly occurring ratios. Ni additions to Co within this anomalous region reduce both tne a and c parameters of the hexagonal structure, while causing the mean atomic volume to fall at the same rate as for the cubic form. Transformation from cubic to hexagonal structure of equivalent composition involves a decrease of nearly 0.6% in atomic volume. 17 ref. (M26, Ni, Co)

337-M. Elektron Micrography. Jean Ternisien. *Microtecnic* (English Ed.), v. 4, Mar.-Apr. 1950, p. 82-88; May-June 1950, p. 137-142; July-Aug. 1950, p. 189-193. (Translated from the French.)

First installment. Fundamental principles and optics of electrostatic and magnetic lenses. Compares the two types. Second part: The instrument and its analogy with the optical microscope. Concluding section: Specimen-mounting procedures and several metallurgical applications. 57 ref. (M21)

338-M. Grain-Size Control in Steel. B. R. Nijhawan. *Transactions of the Indian Institute of Metals*, v. 1, Apr. 1949, p. 53-71.

Summarizes available information. Includes description of methods for determining austenite grain size. (M27, ST)

339-M. The Metallography of Commercial Alloys of the Duralumin Type. Anand S. Sharma. *Transactions of the Indian Institute of Metals*, v. 1, June 1948, p. 39-53; Apr. 1949, p. 11-44; v. 3, 1949, p. 279-307.

Part I: Methods of preparation of different Al alloys, also various aspects of heat treatment. Part II: The binary systems Al-Cu and the ternary systems Al-Cu-Mg, Al-Cu-Si, Al-Cu-Fe and Al-Cu-Mn. Part III: The quaternary systems Al-C-Fe-Mn, Al-Cu-Fe-Si, Al-Cu-Mn-Si, Al-Cu-Mg-Si, Al-Cu-Mg-Fe and Al-Cu-Mg-Mn. Each alloy was examined under the following conditions: chill cast; annealed at the solution temperature for 70 hr.; and solution treated at the same temperature and for the same length of time. Hardness measurements were made immediately after quenching from the solution temperature and at intervals during the progress of aging both at room temperature and at 160° C. Change of hardness was correlated with microstructure. 90 ref. (M24, J27, Al)

340-M. Beryllium Crystals. (In German.) Gustav Jaeger. *Zeitschrift für Metallkunde*, v. 41, Aug. 1950, p. 243-246.

The different crystal forms of Be deposited during the electrolytic decomposition of NaCl-BeCl melts. Debye-Scherrer patterns show that there is no difference in the crystal structures of laminar and acicular Be crystals. 13 ref. (M26, C21, Be)

341-M. Investigation of Metal Surfaces by the Lacquer-Imprint and the Phase-Contrast Processes. (In German.) W. Faasch, G. Hein, and L. Koch. *Metalloberfläche*, sec. A, v. 4, Sept. 1950, p. 129-135.

In many cases, the lacquer-imprint process with simple photo-optical illumination gives results superior to the customary methods of investigation. Comparative photomicrographs support the author's claims. (M23)

342-M. Metallography of Zirconium. H. P. Roth. *Metal Progress*, v. 58, Nov. 1950, p. 709-711.

The perchloric-acetic electrolytic method is shown to be superior to mechanical polishing and chemical etching for Zr and Zr-U alloys. (M21, Zr)

343-M. A New Anodic-Film Method for Studying Orientation in Aluminum. André Hone and E. C. Pearson. *Metal Progress*, v. 58, Nov. 1950, p. 713-715.

An earlier article (Mar. 1948, item 11-59, 1948) described a method of surface preparation which revealed the orientation of grains in aluminum. Subsequent improvements are: An electrolyte and technique which give satisfactory results in a shorter time; the extended use of striations as an aid in observing changes in orientation; the application of the method for macro-etching; and its application for analysis of flow in plastic deformation and for the study of recrystallization. (M21, Al)

344-M. Phase Contrast Metallography. R. L. Seidenberg and J. R. Benford. *Metal Progress*, v. 58, Nov. 1950, p. 725-728.

A new technique for microscopic observation. Conventional metallographic microscopes may be converted to "phase microscopes" by addition of an annular stop in the illuminating system and a phase

disk in the image of the stop. Comparative results. (M21)

345-M. Transfer of Replica From Metal to Electron Microscope. Harold C. O'Brien, Jr. *Metal Progress,* v. 58, Nov. 1950, p. 732.

Improved technique. (M21)

346-M. Galvanic Macro-Etch for High-Purity Aluminum. I. S. Servi. *Metal Progress,* v. 58, Nov. 1950, p. 732-733.

Recrystallized Al bars were dipped for about ¾ of their length into a 15% solution of HCl and externally coupled with an 18-8 stainless steel rod dipped into the same solution. After rinsing, the process was repeated after reversing the position of the bar. The galvanic action due to coupling with a more noble electrode increases the etching rate and gives a better contrast to the final structure. (M21, Al)

347-M. Thermal Polishing and Etching. A. G. Metcalfe and M. J. Olney. *Metal Progress,* v. 58, Nov. 1950, p. 733-734.

Discusses letter from Glen W. Wensch (Apr. issue, item 138-M), which describes phenomena observed on the surface of Ni specimens after long times of annealing in sealed evacuated tubes. Use of the technique to examine metals at elevated temperatures, using a reflecting microscope. (M21, Ni)

348-M. Electrolytic Polishing of Nickel. Glen W. Wensch. *Metal Progress,* v. 58, Nov. 1950, p. 735-736.

Modified bath composition and procedure. (M21, Ni)

349-M. A Note on the Orientated Overgrowths of Metal Films on Single Crystal Inorganic Substrates. H. R. Thirsk. *Proceedings of the Physical Society,* v. 63, sec. B, Nov. 1, 1950, p. 833-839.

Some new examples of metal crystal orientations on inorganic substrates. They include Ag and Fe on mica, Pt on the cube face of KCl, Fe and Ag on the (111) face of KCl, and Ag and Ni on the cube face of MgO. Some of the problems involved in the study of types of crystal growth. Includes diffraction patterns. 19 ref. (M26, Ag, Fe, Pt, Ni)

350-M. Microradiographic Study of Grain Contours of Pure Aluminum and of an Aluminum-Zinc Solid Solution During the Beginning of the Melting Process. (In French.) Aurel Berghezan, Paul Lacombe, and Georges Chaudron. *Comptes Rendus* (France), v. 231, Sept. 18, 1950, p. 576-578.

Results of study, made by the method described by Trillat and Fournier in 1940. Four photomicrographs illustrate the results. During melting of the 12%-Zn Al alloy, Zn crystallizes out at the grain boundaries. (M23, N12, Al, Zn)

351-M. X-Ray Fourier Synthesis of Chemical Bonds. (In German.) Clemens Peters. *Fortschritte der chemischen Forschung,* v. 1, no. 4, 1950, p. 613-641.

Methods of applying Fourier synthesis to analysis of X-ray patterns. Heteropolar or ionic bonds; homopolar or atomic bonds, the transition between heteropolar and homopolar bonding, metallic bonds in Mg and Al, van der Waals bonding and residual valences, and the hydrogen bond. 39 ref. (M22)

352-M. A Magnetostatic Electron "Shadow" Microscope as an Electron-Diffraction Apparatus. (In German.) Bodo v. Borries. *Kolloid Zeitschrift,* v. 118, Aug. 1950, p. 110-112.

Apparatus and typical results. (M21)

353-M. Etching of Metals and Minerals for Ultra-Violet Microscopy. (In Russian.) E. M. Brumberg, G. A. Zaitsov, and T. G. Porokhova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, Aug. 21, 1950, p. 1165-1168.

Technique, method of etching and preparation of specimens. Color plates illustrate results obtainable. (M21)

354-M. Solid Solutions in the System Cobalt-Arsenic (In Russian.) M. I. Kochnev. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, Aug. 21, 1950, p. 1197-1199.

The system was investigated by determination of ignition temperatures of Co-As alloys (44-70% Co) when heated in an air stream. Analysis of the data indicate ranges of solid-solution formation for CoAs, Co_3As_2, Co_2As, and Co_5As_2. (M24, Co, As)

355-M. Value of Structural Analysis of Crystals in Contemporary Science. (In Russian.) J. D. Bernal. *Uspekhi Khimii* (Progress in Chemistry), v. 19, July-Aug. 1950, p. 401-418.

Reviews literature on application of structural analysis to organic, inorganic, and biochemistry; also metallurgy; latest trends in X-ray technique, and branches of technology requiring further study. 59 ref. (M26)

356-M. (Book) **Metallographie** (Metallography). Ed. 3. O. Mies. 68 pages. 1949. Springer Verlag, Berlin, Germany. (Werkstattbücher No. 64). 6s., 4d.

Brief data on the composition of alloys and their metallographic investigation. Divided into three main sections—first, the most important characteristics of iron and steel, their appearance under the microscope and their mechanical properties; second, conditions under which the most important types and forms of iron and steel structures are produced, and third, formation of structures and their properties. (M general, Fe, ST, TS)

357-M. (Book) **X-Ray Crystallography.** Ed. 4. R. W. James. 88 pages. 1950. John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. $1.25.

A brief outline of principles underlying the methods of X-ray crystal analysis. Designed to be of interest to students of other branches of physics, and at the same time capable of serving as an introduction to the subject of crystallography. (M22, M26)

N

TRANSFORMATIONS AND RESULTING STRUCTURES

239-N. Mode of Transition From Hägg Iron Carbide to Cementite. E. M. Cohn and L. J. E. Hofer. *Journal of the American Chemical Society,* v. 72, Oct. 1950, p. 4662-4664.

The reaction of Hägg carbide, Fe_2C, to yield cementite, Fe_3C, and free carbon was found to be a discontinuous (or heterogeneous) precipitation. Hägg carbide and cementite have narrow ranges of composition and apparently do not form intermediate metastable solid solutions. The "unstable" or "labile" carbide of Kolbel and co-workers is believed simply Hägg carbide. 10 ref. (N8, ST)

240-N. Formation of Crystal Nuclei in Liquid Metals. D. Turnbull. *Journal of Applied Physics,* v. 21, Oct. 1950, p. 1022-1028.

The known facts about nucleation phenomena in liquid metals are interpreted satisfactorily on the basis of critical-size and interfacial-energy concepts. In large continuous masses, nucleation is almost always catalyzed by extraneous interfaces. However, in very small droplets, the probability that a catalytic inclusion is present is so much less that their minimum nucleation frequencies are reproducible and form a consistent set of values. Interfacial energies between crystal nuclei and corresponding liquids were calculated from nucleation frequencies of small droplets on the basis of the theory of homogeneous nucleation. Energies of interfaces one atom thick and containing N atoms were calculated. Effect of relative complexity of crystal structure upon supercooling behavior of pure metals apparently is a reflection of its effect upon atomic heat of fusion. 25 ref. (N2, P10)

241-N. Allotropy of Beryllium. S. S. Sidhu and C. O. Henry. *Journal of Applied Physics,* v. 21, Oct. 1950, p. 1036-1037.

The allotropy of Be was confirmed by employing different alloying properties of allotropic forms of metallic elements. Alloys of Be and Au, studied by X-ray diffraction methods, showed that the limit of solubility of Au in Be is between 2 and 3 atomic % and that practically all of it is dissolved in the β-form. Lattice parameters of the two forms observed are given. (N6, Be, Au)

242-N. Local Order in Solid Cu_3Au. R. A. Oriani. *Journal of Applied Physics,* v. 21, Oct. 1950, p. 1068-1069.

Recent X-ray data by Cowley at temperatures above the critical temperature of superlattice formation enable the degree of local order computed from X-ray measurements to be compared with that calculated from thermodynamic activity coefficients measured by Weibke and Quad. Briefly summarizes calculations of local order at the composition Cu_3Au at 500° C., over 100° higher than the critical temperature of superlattice formation. (N10, Cu, Au)

243-N. Formation of Annealing Twins During Grain Growth. R. L. Fullman. *Journal of Applied Physics,* v. 21, Oct. 1950, p. 1069-1070.

Suggests that an annealing twin forms in the corner of a growing grain when the orientation relationships between the twin and the grain's neighbors lead to a smaller total interfacial free energy than do the orientation relationships between the grain itself and its neighbors. A twin boundary then forms in a corner of the grain, and the grain continues to grow as a twin of the original crystal. (N3)

244-N. Deformation and Recrystallization of Alloys Containing Two Phases. L. M. Clarebrough. *Australian Journal of Scientific Research,* ser. A, v. 3, Mar. 1950, p. 72-90.

Using mainly Ag-Mg alloys, deformation of the phases was determined from observations of slip lines and recrystallization behavior. Relative deformation of the two phases is influenced both by total deformation of the alloy and by volume fractions of the phases. Recrystallization behavior in a duplex alloy is affected by the state of order of the phases, and by precipitation occurring in one of the phases on annealing the deformed alloy. Brasses and an 80-20 Cu-Fe alloy were also studied. (N5, Q24, Ag, Mg, Cu)

245-N. Self-Diffusion in Tin Crystals. P. J. Fensham. *Australian Journal of Scientific Research,* ser. A, v. 3, Mar. 1950, p. 91-104.

Rate of self-diffusion in single crystals of white Sn of various ori-

entations was measured using the radioactive isotope Sn^{113}. Anisotropy is discussed in terms of the vacancy mechanism of diffusion. (N1, Sn)

246-N. Self-Diffusion in Polycrystalline Tin. P. J. Fensham. *Australian Journal of Scientific Research,* ser. A, v. 3, Mar. 1950, p. 105-108.

Rate of volume diffusion, indicated by darkening of photographic films, is in general agreement with previous measurements of rate of self-diffusion in different crystallographic directions. Rate of diffusion along grain boundaries is generally considerably higher than that of volume diffusion except when the boundary is between twins or between crystals of similar orientations. Observations are discussed in terms of recent theories. 10 ref. (N1, Sn)

247-N. Problems of the Heat Resistance of Alloys. (In Russian.) I. Dekhtyar. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, July 11, 1950, p. 303-305.

Analyzed on the basis of electronic theory. Investigation of diffusion in alloys indicates that its probable mechanism is filling of vacancy centers in the lattice by the diffusing atoms. If this is the case, it is of fundamental importance to the mechanism of creep. 11 ref. (N1, Q3, SG-h)

248-N. Concerning the Transformation of Deformed Austenite Into Martensite. (In Russian.) G. V. Kurdyumov, O. P. Maksimova, and T. V. Tagunova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, July 11, 1950, p. 307-310.

Influence of austenite deformation on the kinetics of austenite transformation into martensite during subsequent cooling and, in particular, on rate of isothermal transformation and its temperature dependence, was investigated, using a ferrous alloy containing 23% Ni and 3.4% Mn. 10 ref. (N8, AY)

249-N. "Coagulation" and Decomposition of Carbides (Graphitization) During Annealing of Silicon Steel. (In Russian.) S. Z. Bokshtein. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, July 11, 1950, p. 311-314.

Investigated for 0.4% C steels containing 0.25, 1.75, and 2.75% Si, quenched from 930 and 980° C., and annealed at 700° C. for 10 min. to 25 hr. Results are discussed from the point of view of their application to explanation of the mechanism of graphitization. (N8, J23, AY)

250-N. Influence of Alloying Elements on Decomposition of Martensite During Annealing of Steel. (In Russian.) S. Z. Bokshtein. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, July 21, 1950, p. 491-494.

Investigated on medium-carbon steel with addition of one of the following elements—Ni, Mn, Cr, Mo, V, or Si—after annealing between 200 and 650° C. for 1 min. to 25 hr. 10 ref. (N8, J23, AY)

251-N. Continuous Solid Solutions of Metals of the Transition Group of Mendeleev's Periodic System of the Elements. (In Russian.) I. I. Kornilov. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, July 21, 1950, p. 495-497.

Possibility of predicting the solid solubility ranges of binary combinations of the various elements found in the 8th group of the periodic table, on the basis of known values for the binary solutions with Fe and values for atomic diameters of the different elements. Includes table for the various combinations. (N12)

252-N. Problems in the Study of the Initial Stages of Melting of Complex Metal Systems. (In Russian.) N. T. Gudtsov and M. G. Lozinskii. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, Aug. 1, 1950, p. 689-692.

Experiments on vacuum melting of an alloy steel (0.12% C, 1.0% Mo, 2.5% Co, 1.2% Cb, 0.7% Mn, and 0.8% Si) at temperatures up to 1300-1350° C., pressure of 10^{-5} mm. Hg, and heating rates of 100° C. per min. Diagram shows special apparatus developed for the purpose. For the first time, individual foci of austenitic grain melting were revealed. (N12, D8, AY)

253-N. Diffusion Processes in Metals. (In Czech.) Vl. Sedlacek. *Hutnické Listy,* v. 5, July 1950, p. 277-286.

Fundamental theory and individual types of diffusion. An empirically deduced relation for depth of the diffusion layer and relation of diffusion coefficient to temperature. The diffusion processes are divided into four basic types, namely Schottky, Frenkel, position-exchange, and channel diffusion; these particular types are discussed with respect to internal structure of the material. From analysis of theoretical equations, assumptions are made regarding influence of various factors, especially that of pressure, on diffusion coefficient. (N1)

254-N. Hydrogen Elimination by Aging. C. E. Sims. *Journal of Metals,* v. 188, Nov. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1321.

On the basis of experience with accelerated aging of 1 and 4-in. cast steel coupons and room temperature aging of 1-in. coupons, it was predicted that, some time after two years and when the hydrogen content has been reduced to about 0.10 relative volume, there would be some recovery of ductility. Experimental data show, by extrapolation from 555 days, that about 6 years would be required at room temperature for complete recovery of ductility at the center of 4-in. coupons. (N7, Q23, CI)

255-N. The Formation of Annealing Twins. J. E. Burke. *Journal of Metals,* v. 188, Nov. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1324-1328.

Critical discussion and analysis of literature. Three conditions which must be fulfilled for growth of annealing twins. Although they are prominent only in recrystallized metals, deformation is not necessary to produce them. Rather, they may form whenever a grain boundary migrates. 12 ref. (N5)

256-N. Transformation Characteristics of a Lithium-Magnesium Alloy. C. S. Barrett and D. F. Clifton. *Journal of Metals,* v. 188, Nov. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1329-1332.

The martensite-type transformation curves for a 12.4 atomic % Li Mg-base alloy were investigated by X-ray spectrometer methods. Critical temperatures for formation and decomposition of the low-temperature phase; influence of previous thermal and mechanical history. (N9, Mg)

257-N. A Special Case of Carbon Diffusion: From Cast Iron to Cast-In Steel. (In English.) J. E. de Graaf. "International Gieterij Congres 1949—Amsterdam", p. 106-117; discussion, p. 117.

Microstructures and governing factors. Solubility of carbon in homogeneous solution at the temperature of strong diffusion is the main factor. The diffusion coefficient seems to play a minor role. (N1, CI)

258-N. Anomalies of Segregation in Super-Cooled Binary Melts, Especially the So-Called Formation of Halos. (In German.) Adelheid Kofler. *Zeitschrift für Metallkunde,* v. 41, Aug. 1950, p. 221-226.

A review of literature. Compares observations on nucleus formation in organic compounds with a similar phenomenon in metals. Binary phase diagrams show the regions of "halo" formation for typical cases. (N12)

259-N. Crystallization of Copper in Contact With Mercury. (In German.) Erwin W. Muller, Iwan N. Stranski, and Eugen Szabo de Bucs. *Zeitschrift für Metallkunde,* v. 41, Aug. 1950, p. 226-227.

Studies made to explain the change in crystallization of Cu caused by contact with Hg. Experiments showed that temperature and previous heat treatment have a profound effect on this phenomenon. (N12, Cu)

260-N. Alloys of Gold With Cobalt and Iron. (In German.) Ernst Raub and Paul Walter. *Zeitschrift für Metallkunde,* v. 41, Aug. 1950, p. 234-238.

Reviews literature on phase relationships and transformations of Au-Co and Au-Fe systems, their respective limits of saturation, melting points, transformation temperatures, heat-cooling curves, and lattice constants. 15 ref. (N9, M24, Au, Co, Fe)

261-N. The Age Hardening of Iron-Gold Alloys. (In German.) Werner Köster and Eberhard Braun. *Zeitschrift für Metallkunde,* v. 41, Aug. 1950, p. 238-240.

Mechanical and magnetic age hardening of an Fe-Au alloy (10% Au) in the range 400-700° C. were studied. Activation energy of the process was about 72,000 cal. per mol., while that of the age hardening of Fe by means of Cu is about 33,000 cal. per mol. (N7, Fe)

262-N. The AuCu Transformation in Ternary Alloys. (In German.) Ernst Raub and Paul Walter. *Zeitschrift für Metallkunde,* v. 41, Aug. 1950, p. 240-243.

Reviews the literature dealing with the effect of Ag and of Ni on the transformation. Effects of Cd, Ti, Mg, Al, and Mn were studied. 12 ref. (N9, Au, Cu)

263-N. Experiments on the Effect of Hydrogen on Grain Growth in Magnesium and Magnesium Alloys. (In German.) Walter Mannchen. *Zeitschrift für Metallkunde,* v. 41, Aug. 1950, p. 255-260.

Shows that the grain-refining effect of Ca and other hydride-forming elements is due to the presence of traces of H_2—proved by the fact that the introduction of gaseous H_2 into the melt has the same effect. Addition of Cl is effective only when it is followed by addition of H_2. Tabulated data and macrographs. (N3, Mg, H)

264-N. Physical Principles of Diffusion in Metals. (In French.) P. Laurent. *Métaux et Corrosion,* v. 25, July-Aug. 1950, p. 172-187.

A comprehensive review on the basis of the literature and the author's experiences. Theoretical aspects, such as general equations of diffusion, are analyzed. 21 ref. (N1)

265-N. Probable Mechanism of Martensite Dissociation (In Russian.) Yu. A. Bagaryatskii. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, Aug. 21, 1950, p. 1161-1164.

The relationship between martensite and cementite structures and the possible mechanism of their rearrangement was theoretically studied. Postulates that, for low-temperature annealing, the transformation consists of: "twinning" of the martensite lattice along the (121) planes; displacement of atoms towards the "twinning" planes; and a certain warping of the atomic planes caused by the C atom displacement. These processes do not require displacement of Fe atoms. 10 ref. (N8, ST)

266-N. Kinetics of Polymorphous Transformation of Alloys of Iron. (In Russian.) L. I. Kogan and R. I. Entin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, Aug. 21, 1950, p. 1173-1176.

Results of a study of the γ-α transformation of Fe alloyed with Cr + Ni, Cr, Ni + Mo, and Cr + Co. Influences of alloying elements on displacement of critical points, formation of nuclei, and the energies of "activation" were investigated. (N8, Fe)

267-N. Annealing of Twinned Crystals of Iron. (In Russian.) R. I. Garber, I. A. Gindin, M. G. Konstantinovskii, and V. I. Startsev. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Sept. 11, 1950, p. 343-344.

Investigation showed complete analogy of twinning in iron to the previously demonstrated phenomenon in sodium nitrate: thin wedge-shaped twins are easily eliminated by subsequent annealing. Test apparatus and photomicrographs. (N5, Q24, Fe)

P

PHYSICAL PROPERTIES AND TEST METHODS

325-P. Some Magneto-Acoustic Effects in Nickel. T. F. Rogers and S. J. Johnson. *Journal of Applied Physics*, v. 21, Oct. 1950, p. 1067-1068.

An investigation was made of effects produced by a magnetic field upon the ultrasonic propagation properties of a 99.4% Ni rod. Magneto-acoustic effects are charted and discussed. (P16, P10)

326-P. Influence of Electrodes on D-C Breakdown in Gases at High Pressure. J. G. Trump, R. W. Cloud, J. G. Mann, and E. P. Hanson. *Electrical Engineering*, v. 69, Nov. 1950, p. 961-964.

D.C. breakdown measurements up to 900 kv. between metallic electrodes producing a uniform field and immersed in compressed gases show markedly higher values for stainless steel after conditioning by sparkover than for aluminum electrode systems. Sparkover voltage measurements were made in air, in CO_2, in equal mixtures of CO_2 and N, and in N_2. Relative insulating strength of these gases diminished in the order listed, and a similar electrode dependence on higher pressure was shown in all of them. (P15, Al, SS)

327-P. Technical Apparatus for Determining Thermal Conductivity of Steels up to 500° C. Z. Horak and F. Krupka. *Review of Scientific Instruments*, v. 21, Oct. 1950, p. 827-830.

Apparatus based upon comparison of flux of heat in a conductor in the form of a bar consisting of three parts of different materials. This method enables one to measure the temperature gradients by only one differential thermocouple sliding in an axial boring of the bar. (P11, ST)

328-P. Contact Potentials of Evaporated Iron Films in Air and in Nitrogen at Low Pressure. Norman Hackerman and Leland L. Antes. *Science*, v. 112, Oct. 20, 1950, p. 471.

Results of experiments. (P15, Fe)

329-P. Low Temperature Ferromagnetism of Sigma Phase in an Alloy Steel. K. W. J. Bowen and T. P. Hoar. *Research*, v. 3, Oct. 1950, p. 484.

It was found that subzero treatment at various temperatures down to −196° C. of a steel containing 18.4% Cr, 8.45% Ni, 3.40% Mo, 0.47% Ti, etc., previously heat treated 0.5-100 hr. to produce sigma phase, leads to an increase in ferromagnetism, part of which is permanent and part reversible on temperature change. (P16, N8, SS)

330-P. Active Centres on Metal Surfaces. *Chemical Age*, v. 63, Oct. 7, 1950, p. 507-509.

New theory and experimental results presented in some recent German papers. (P10)

331-P. The Determination of the Viscosity of Molten Metals. M. R. Hopkins and T. C. Toye. *Proceedings of the Physical Society*, v. 63, sec. B, Oct. 1, 1950, p. 773-782.

Method applicable up to about 900° C. The metal is contained in a cylindrical crucible which is allowed to oscillate about its axis under the control of the torsion in a suspension wire. Theory of the method. The viscosity of Zn was determined from 430-480° C. by this method. 11 ref. (P10, Zn)

332-P. High Frequency Permeability of Ferromagnetic Materials. R. Millership and F. V. Webster. *Proceedings of the Physical Society*, v. 63, sec. B, Oct. 1, 1950, p. 783-795.

Methods for measurement of resistive and inductive permeabilities from 150 to 10,000 Mc./s. The following materials were investigated, all in wire form: Swedish charcoal iron, white annealed and bright; 0.50-0.55% carbon steel, white annealed and bright; and "Mumetal 6" (77% Ni, 15% Fe, 5% Cu, 2% Cr, 0.8% Mn, 0.1% Si), hard drawn. 24 ref. (P16, Fe, CN, Ni, SG-n, p)

333-P. Electrical Conductivity of Gray Tin. J. T. Kendall. *Proceedings of the Physical Society*, v. 63, sec. B, Oct. 1, 1950, p. 821-822.

Gray tin has a nonmetallic crystal structure similar to diamond. Data on variation of its electrical conductivity with temperature were determined and compared with those for Si and Ge. It is apparent that gray tin is an intrinsic semiconductor. (P15, Sn)

334-P. Heat Flow in Superconductive Alloys. K. Mendelssohn and J. L. Olsen. *Proceedings of the Physical Society*, v. 63, sec. A, Oct. 1, 1950, p. 1182-1183.

Thermal conductivity of Pb alloys containing 0.02, 0.1, 0.2, and 0.5% Bi was determined in the 2-10° K. region. Results are charted and discussed in terms of fundamental theory. (P11, Pb)

335-P. Some Optical Properties of Evaporated Layers of Silver, Copper and Tin. D. G. Avery. *Philosophical Magazine*, ser. 7, v. 41, Oct. 1950, p. 1018-1031.

Use of multiple-beam interferometry to determine relative phase changes on reflection at the silvered surfaces of an interferometer does not approach the accuracy of the older polarimetric methods. Measurements of relative phase changes on reflection at a number of layers of Ag, Cu, and Sn, together with measurements of the ellipticity of the light reflected. Variation of these quantities with thickness of some layers of Ag in relation to use of evaporated layers for measurement of the optical constants of bulk materials. 14 ref. (P17, Ag, Cu, Sn)

336-P. Experimental Study of β-Ray Diffusion in Metallic Foils. (In French.) Julien Verhaeghe and Joseph Allewaert. *Comptes Rendus* (France), v. 231, July 10, 1950, p. 135-137.

An experimental verification of E. J. Williams' law of distribution of angular deviation of β-rays upon passing through metallic foils. Method of verification (using Cu, C, and Au foils). (P13, Cu, Au, C)

337-P. Method of Study and Interpretation of Heterogeneity of Ferromagnetic Substances in the Rayleigh Regions. (In French.) Israel Epelboin, André Marais, and Daniel Dautreppe. *Comptes Rendus* (France), v. 231, July 17, 1950, p. 222-224.

Method is characterized by successive electropolishing of ferromagnetic strips and wires. Data obtained from ferrosilicon strips subjected to various treatments are charted. (P16, Fe, SG-n)

338-P. A New Method for Determination of Magnetostriction. Application to Cobalt Ferrite. (In French.) Louis Weil, Maurice Gallay, and Pierre Poensin. *Comptes Rendus* (France), v. 231, July 17, 1950, p. 224-226.

Proposes use of strain gages. Precision of the method is not over 1%; however, in connection with industrial electronic devices, it permits very rapid determinations to be made on specimens of any shape. Experimental investigation of cobalt ferrite fully proves applicability of the method. (P16, SG-n)

339-P. Variation of Contact Resistance With Contact Pressure. (In German.) Eugen Kappler. *Zeitschrift für angewandte Physik*, v. 2, Aug. 15, 1950, p. 313-319.

Effects of various factors on the above variation for "crossed-wire" contacts of precious metals and their alloys were investigated. These included effects of applied load resulting in plastic deformation, of mono-molecular and thicker foreign films, of surface condition, elastic after-effect and hysteresis. (P15, EG-c)

340-P. The Optical Reflecting Power of Vapor-Deposited AlAg and AlMg Alloys. (In German.) A. Boettcher. *Zeitschrift für angewandte Physik*, v. 2, Aug. 15, 1950, p. 340-343.

Experiments made to measure reflecting power by a photometric method within the range 2500-5000 A. Results are shown graphically. (P17, Al, Ag, Mg)

341-P. Active Centers in Metals. (In German.) Otto Erbacher. *Angewandte Chemie*, v. 62, Sept. 7, 1950, p. 403-404.

Shows that active centers occur especially in mechanically worked surfaces of metals whose melting points exceed 1300° K. Elaborates on the theory of the "healing" of "disturbance centers" at a temperature of about 2/3 of the absolute melting point of the metal. (P12)

342-P. Electrical Contacts in Measuring Instruments. (In German.) Ragnar Holm. *Archiv für technisches Messen*, Aug. 1950, p. T95-T96 (4 p.).

Effects of various factors on electrical conductivity and resistance of mono and bimetallic contacts. Data for a series of bimetal combinations. 12 ref. (P15, SG-r)

343-P. Electrostatic Obstruction of Ion Adsorption on Metal Surfaces. (In German.) Otto Erbacher. *Zeitschrift*

für Elektrochemie und angewandte physikalische Chemie, v. 54, Aug. 1950, p. 369-374.

Several examples indicate that the Ostwald isotherms resulting from adsorption of metal ions on metal surfaces are not the sums of Langmuir isotherms of different active centers, but are the result of mutual electrostatic obstruction of the adsorption process. (P13)

344-P. Experiments Made To Measure the Electrical Conductivity of Gray Tin. (In German.) G. Busch, J. Wieland, and H. Zoller. *Helvetica Physica Acta*, v. 23, Sept. 1, 1950, p. 528-529.

Results of experiments made with pure α-tin and its alloys containing less than 1% of other elements. It was found that the metal has inherent conductivity at high temperatures but is semiconducting at low temperatures. (P15, Sn)

345-P. The Activity of Sulphur in Liquid Steel; The Influence of Copper. Terkel Rosenqvist and Earl M. Cox. *Journal of Metals*, v. 188, Nov. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 188, 1950, p. 1389-1393; discussion, p. 1393.

Steel melts of various S and Cu contents were brought into equilibrium with a H_2S-H_2 mixture of the escaping tendency of sulfur. It was shown that small amounts of Cu lowered the sulfur activity, but not sufficiently to affect the desulfurization process. 11 ref. (P12, ST)

346-P. Isothermal Decomposition of Nickel Carbide. L. J. E. Hofer, E. M. Cohn, and W. C. Peebles. *Journal of Physical & Colloid Chemistry*, v. 54, Nov. 1950, p. 1161-1169.

The present study like a previous one of a carburized cobalt Fischer-Tropsch catalyst was made to gain more insight into the formation of free carbon during hydrocarbon synthesis. Thermal stability of Ni_3C was studied magnetically and by X-ray diffraction between 320 and 355° C. on a fully carburized and on an almost fully carburized sample. 18 ref. (P13, C-n, Ni)

347-P. Electron Transfer in Intermetallic Compounds. Linus Pauling. *Proceedings of the National Academy of Sciences*, v. 36, Oct. 1950, p. 533-538.

Analysis of interatomic distances shows that electron transfer takes place in a great many interatomic compounds, and that the numbers of electrons involved are reasonable, in relation to the changes in valence resulting from loss or gain of electrons and to the partial ionic character of the bonds between unlike atoms and the striving of atoms toward electroneutrality. (P10)

348-P. The Soft X-Ray Valence Band Spectra and the Heat of Formation of Chemical Compounds and Alloys. K. Das Gupta. *Physical Review*, ser. 2, v. 80, Oct. 15, 1950, p. 281-282.

The soft X-ray K-valence emission spectra of Mg, Al, and Si in the pure metallic state, as well as in their oxides; of silicon in SiC; and L_{III}-valence emission spectra of Fe in $AlFe_3$ were investigated in a vacuum spectrograph.
(P12, P13, Mg, Al, Si)

349-P. Single Crystal Magnetostriction Constants of an Iron-Cobalt Alloy. J. E. Goldman. *Physical Review*, ser. 2, v. 80, Oct. 15, 1950, p. 301-302.

A resistance strain-gage technique was used for measurement of magnetostriction in very small single crystals of Fe-Co (30% Co).
(P16, Fe, Co)

350-P. Theory of Magnetic Anisotropy in Alnico V. J. E. Goldman and R. Smoluchowski. *Physical Review*, ser. 2, v. 80, Oct. 15, 1950, p. 302-303.

New theory which explains the unusual sensitivity of the Alnico V effect to composition.
(P16, Al, Ni, Co, SG-n)

351-P. The Influence of a Transverse Magnetic Field on the Conductivity of Thin Metallic Films. E. H. Sondheimer. *Physical Review*, ser. 2, v. 80, Nov. 1, 1950, p. 401-406.

Theoretical analysis for films of thickness comparable with the free path of the conduction electrons. Owing to scattering of electrons at the boundaries of the film, the Hall coefficient is increased, and electrical resistance oscillates with strength of the applied magnetic field. (P15)

352-P. On the Ordering Effect of Antiferromagnetism. Yin-Yuan Li. *Physical Review*, ser. 2, v. 80, Nov. 1, 1950, p. 457-460.

Shows, by means of the Heisenberg model, that, in general, Curie temperature of antiferromagnetism depends on external field. It is also predicted that when an antiferromagnetic crystal with face-centered cubic or close-packed hexagonal magnetic lattice is kept at sufficiently low temperatures, its neutron diffraction pattern should show a transition from that due to an order of the $\alpha\beta$-type to that of the $\alpha\beta_3$-type as the applied field is greatly increased. 11 ref. (P16)

353-P. The Kinetics of the Reactions of Beryllium With Oxygen and Nitrogen and the Effect of Oxide and Nitride Films on Its Vapor Pressure. Earl A. Gulbransen and Kenneth F. Andrew. *Journal of the Electrochemical Society*, v. 97, Nov. 1950, p. 383-395.

Reaction with O_2 was studied from 350 to 950° C, and the reaction with N_2 from 600 to 925° C. No reaction was observed with H_2 from 300 to 882° C. A study of the vapor pressure of Be and the influence of oxide and nitride films was made using the Langmuir method. Oxide films exert a strong effect in reducing the vapor pressure, the effect varying as the square root of oxide thickness. 35 ref. (P12, Be)

354-P. The Kinetics of the Reactions of Vanadium With Oxygen and Nitrogen. Earl A. Gulbransen and Kenneth F. Andrew. *Journal of the Electrochemical Society*, v. 97, Nov. 1950, p. 396-404.

A study was made of the reaction of rolled V sheet with O_2 from 400 to 600° C. The reaction with N_2 was studied from 600 to 900° C. Compares results with those for corresponding reactions of Cb and Ta. 35 ref. (P12, V)

355-P. Density Variations in Aluminium. J. L. Snoek. *Philosophical Magazine*, v. 41, Nov. 1950, p. 1188-1192.

From careful determinations of the density of samples of Al in various conditions, the conclusion is drawn that grain boundaries in Al may have a more spacious structure than is generally assumed.
(P10, M27, Al)

356-P. The de Haas-van Alphen Effect. R. B. Dingle and D. Shoenberg. *Nature*, v. 166, Oct. 14, 1950, p. 652-653.

Experiments on the above effect in Ga, Sn, and graphite (periodic field-dependence of magnetic susceptibility of metal single crystals) have now been extended to higher fields (up to 15,800 gauss), to lower temperatures (down to 1.1° K.), and to other metals; at the same time theory of the effect was reconsidered. (P16)

357-P. Change of Resistivity by Cold Working at Liquid-Air Temperature. J. Molenaar and W. H. Aarts. *Nature*, v. 166, Oct. 21, 1950, p. 690.

Relative change of resistivity with plastic deformation at liquid-air temperature was measured for wires of Cu, Ag, and Al. These were soft-annealed and stretched. The tension producing extension as well as the resistivity were measured.
(P15, Cu, Ag, Al)

358-P. The Thermodynamic Background of Iron and Steelmaking Processes. II. Deoxidation. F. D. Richardson. *Journal of the Iron and Steel Institute*, v. 166, Oct. 1950, p. 137-146.

Critically surveys thermodynamic data available for solutions of O_2 and alloying elements in liquid Fe. The main deoxidation equilibria are summarized in two diagrams for 1600 and 1540° C. The general pattern of the results is discussed in terms of the interaction of dissolved O_2 and dissolved deoxidizer in the liquid metal. 42 ref.
(P12, D general, ST)

359-P. Some Heat-Transfer Problems Simplified. (In English.) J. S. Abcouwer. "International Gieterij Congres 1949—Amsterdam", p. 147-161.

A mathematical treatise of heat transfer as related to casting production. (P11, E general)

360-P. Systematic Relationships of the Properties of Molten Metals and Alloys. III. (In German.) Franz Sauerwald. *Zeitschrift für Metallkunde*, v. 41, July 1950, p. 214-218.

Lowering of solidification point due to alloy additions. Supplementary remarks concerning thermodynamic properties, especially for those alloys having negative heats of formation. The volumetric behavior of Mg-Pb and Mg-Sn alloys. Analyzes X-ray data for a series of nonferrous binary alloys, also for Rose's, Wood's and Lipowitz's metals.
(P12, EG-a, SG-d)

361-P. Cathodic Efficiency of Metals, Especially of Aluminum in Common Salt Solutions. (In German.) Richard Ergang and Georg Masing. *Zeitschrift für Metallkunde*, v. 41, Aug. 1950, p. 272-279.

Results of experiments on Fe, Cd, Cu, Pt, and Al in their various binary combinations, in 3% NaCl solutions of different pH's and for various periods of time. Data are tabulated and charted. 14 ref.
(P13, Fe, Cd, Cu, Pt, Al)

362-P. Relation Between Thermal and Electrical Conductivity of Aluminum and Magnesium Alloys. (In German.) W. Bungardt and R. Kallenbach. *Metall*, v. 4, Aug. 1950, p. 317-321; Sept. 1950, p. 365-369.

Because of the difficulty of determining the thermal conductivity of metals at elevated temperatures, the relationship was studied on the basis of literature data. Factors which affect conductivity such as impurities, heat treatments, etc., are also considered. Sept. issue: The validity of the Wiedemann-Franz-Lorenz equation was investigated. Also, relations between thermal, electronic, and lattice conductivity. 35 ref. (P11, P15, Al, Mg)

363-P. Magnetic Properties of Cu-Fe Sintered Alloys. (In German.) Helmut Rainer. *Metall*, v. 4, Oct. 1950, p. 416-420.

Density, elongation, remanence, coercive force, saturation, and demagnetization curve of alloys containing up to 10% Cu (produced by two different methods) were determined as functions of Cu content and sintering temperature. The increase in remanence with temperature above 500° C. is explained by Sauerwald's theory of bridge formation. (P16, H15, Fe)

364-P. Heat Changes Accompanying Magnetization in Low and Moderate Fields: the Effects of Strain, and a Theoretical Interpretation. L. F. Bates and J. H. Davis. *Proceedings of the Physical Society*, v. 63, sec. A, Nov. 1, 1950, p. 1265-1282.

The technique of Bates and coworkers was used to measure the adiabatic temperature changes occurring during magnetization of nickel under progressively increased internal strain occurring during

change from the fully annealed state to the state of maximum strain, in the absence of deforming force. A new technique enabled accurate thermal curves during virgin magnetization, and in cycles up to 400 oersteds, to be obtained. The induction effect previously reported was investigated and its origin determined. A new theoretical treatment enables thermal curves to be calculated from available data on magnetization and magnetostriction. 10 ref. (P16, Ni)

365-P. A Study of Electrical Forming Phenomena at Selenium Contacts. H. K. Henisch and J. Ewels. *Proceedings of the Physical Society*, v. 63, sec. B, Nov. 1, 1950, p. 861-876.

When a reverse voltage is applied to a rectifying contact between a selenium surface and a metal electrode, the resulting current is not constant but is generally a function of time. An increase of current with time is called positive creep and a decrease at constant voltage is referred to as negative creep. Experiments at various temperatures on Se specimens of different impurity content. Dependence of above phenomena on electrical and thermal history and on nature of the counterelectrode. A theory of "current creep" is proposed. (P15, Se)

366-P. Physical Chemistry of Metallurgical Processes. (Concluded.) Proceedings of September 1948 Discussions of the Faraday Society. (In French.) Maurice Rey. *Revue de Métallurgie*, v. 47, Sept. 1950, p. 658-668.

Final installment presents detailed summaries of pertinent papers previously abstracted presented at above meeting. 34 ref. (P12)

367-P. The Zener Effect in Metals. (In Italian.) I. Barducci. *Alluminio*, v. 19, no. 4, 1950, p. 324-333.

Theoretical discussion of the thermoelastic (Zener) effect. Internal dissipation of elastic energy of a solid; internal dissipation of energy by vibration and bending; characteristics of the Zener effect; importance of the thermo-elastic effect; the magneto-elastic effect. 15 ref. (P11, Q21)

368-P. Life of an Incandescent Tungsten Coil and Vaporization Rate of Tungsten in a High Vacuum. (In German.) Enis Bas-Taymaz. *Zeitschrift für angewandte Physik*, v. 2, Sept. 15, 1950, p. 374-376.

Relationship to temperature was investigated. It was found that the life of the W coil may be considered terminated when its weight loss has reached a certain percentage. Since this percentage is independent of temperature, life measurements at different temperatures may be used to compute the temperature coefficient of vaporization rate. (P12, W)

369-P. A Contribution to the Problem of Anomalous Diamagnetism. (In Russian.) H. Nowotny and H. Bittner. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 81, Oct. 15, 1950, p. 887-906.

Theories and research on anomalous diamagnetism in the Hume-Rothery γ-phases. Method and apparatus for measuring diamagnetism. Data for a variety of nonferrous alloys. 34 ref. (P16, EG-a)

370-P. Single Domain Structure in Ferromagnetic Substances and Magnetic Properties of Finely Dispersed Materials. (In Russian.) E. Kondorskii. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Sept. 11, 1950, p. 213-216.

Magnetic properties of ferromagnetic substances composed of spherical and elliptical particles and the relationship of their coercive force to shape and size were theoretically investigated. Equations are proposed and interpreted for different values of variables. (P16, SG-n)

371-P. Temperature Dependence of Magnetization Curves and Hysteresis Loops of Highly Coercive Alloys. (In Russian.) Ya. S. Shur and N. A. Baranova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Sept. 11, 1950, p. 225-228.

Investigated for "Alnico" and "Vicalloy" (51% Fe, 24% Co, 8% Ni, 3% Al; and 52% Co, 38% Fe, 10% V, respectively). The former was quenched from 1300 and annealed at 600° C. for several hours; the latter was cold worked and then annealed at 600° C. for 30 min. (P16, SG-n)

372-P. Determination of Thermal Emission by Means of Thermomagnetic Convection. (In Russian.) D. I. Ageikin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Sept. 11, 1950, p. 229-232.

The method and theoretical analysis of the proposed equations. Experimental investigations on platinum wires fully confirm the validity of the method. (P11, S16)

373-P. (Book) Die thermodynamischen Eigenschaften der Metalloxyde. Ein Beitrag zur theoretischen Hüttenkunde. (The Thermodynamic Properties of the Metal Oxides. A Contribution to Theoretical Metallurgy). Werner Lange. 107 pages. 1949. Springer-Verlag, Berlin, Germany.

Methods of computing thermodynamic properties of CO, CO_2, water vapor, and a series of metallic oxides. Typical examples. 132 ref. (P12)

Q

MECHANICAL PROPERTIES AND TEST METHODS; DEFORMATION

761-Q. Subzero Properties of Metal Surveyed. E. J. Ripling. *Iron Age*, v. 166, Oct. 19, 1950, p. 76-80; Oct. 26, 1950, p. 53-57.

First part: Low-temperature properties of steel, effect of embrittling agents on transition temperatures, definition of transition-temperature values, effect of tempering temperatures, and the relationship between low-temperature strength properties and stress severity. Second part: It is shown that face-centered cubic metals (most Al and Cu-base alloys, austenitic steels) retain their toughness and ductility, even at very low temperatures. The poor low-temperature performance of martensitic steels tempered near 600° F., and of most annealed steels, is at least rheotropic. (Q23, AY)

762-Q. Hardened Alloy Steel for Service Up to 700 Deg. F. *Industrial Heating*, v. 17, Oct. 1950, p. 1756, 1758. Condensed from paper by G. V. Smith, W. B. Seens, and E. J. Dulis.

Previously abstracted from *American Society for Testing Materials*, Preprint 36, 1950. See item 473-Q, 1950. (Q general, AY)

M. R.—1225 . . 7on7 . . Nov. 13 . . GUS

763-Q. Three-Minute Quality Test for 85-5-5-5 Red Brass. *American Foundryman*, v. 18, Oct. 1950, p. 30-32.

Report of the A.F.S. Brass & Bronze Research Committee on fracture test as an index of melt quality. Pouring the test block and interpretation of fractures. (Q26, E10, Cu)

764-Q. Design of Steel Ring Flanges for Water Works Service—A Progress Report. Russell E. Barnard. *Journal, American Water Works Association*, v. 42, Oct. 1950, p. 931-939; discussion, p. 939-944.

Experimental program designed to obtain stress data. Details of test procedure. Develops practical method for designing flanges on the basis of the results. (Q25, T4, CN)

765-Q. Fatigue Tests of Beams in Flexure; Advance Report of Committee 15—Iron and Steel Structures. *American Railway Engineering Association, Bulletin*, v. 52, Sept.-Oct. 1950, p. 111-129.

Summary of the results of fatigue tests conducted by Prof. W. M. Wilson at University of Illinois on various types of beams similar to those used in actual structures and subjected to repeated loading cycles. Load cycle was repeated at about 150 cycles per min. until failure developed at some location in the beam. Stresses were calculated from the known loads, and fatigue strengths at 100,000 and 2,000,000 cycles were determined from an empirical equation. Fatigue data were obtained on 27 different types of beams. (Q7, CN)

766-Q. The Propagation of Plastic Deformation in Solids. Theodore von Karman and Pol Duwez. *Journal of Applied Physics*, v. 21, Oct. 1950, p. 987-994.

The stress wave caused by longitudinal impact at the end of a cylindrical bar was analyzed for the case where impact velocity is large enough to produce plastic strain. The theory gives a method for computing stress distribution along the bar at any instant during impact. Shows that, for a given material, there is a critical impact velocity above which the material should break near the impacted end with negligible plastic strain. Includes results of an experimental investigation on copper, mild steel, and iron. (Q25, Q23, Cu, Fe, CN)

767-Q. Effective Stress and Effective Strain in Relation to Stress Theories of Plasticity. G. N. White, Jr., and D. C. Drucker. *Journal of Applied Physics*, v. 21, Oct. 1950, p. 1013-1021.

Shows that the stress-strain relations of a recent theory of plasticity provide a convenient means of defining and studying effective stress and effective strain. The strong theoretical and practical limitations of such concepts are indicated; and the calculation of specific plastic work is discussed for both isotropic and anisotropic metals. 19 ref. (Q23)

768-Q. Tensile Properties of Ingot Iron at Low Temperatures. Glenn W. Geil and Nesbit L. Carwile. *Journal of Research of the National Bureau of Standards*, v. 45, Aug. 1950, p. 129-147.

True stress-strain curves obtained in tension tests at temperatures of −196° to 100° C. with ingot iron as annealed, normalized, quenched and tempered, hot rolled, and cold drawn. Numerous simultaneous load and diameter measurements were made during each test. Effects of prior thermal and mechanical treatment on true stress-strain relations. Influence of testing temperature, ferrite grain size, and initial condition of the iron on work hardening characteristics. Effects of above factors on yield stress and ultimate stress, and on true stress and true strain at maximum load and at fracture. Twinning of iron at low temperatures. 31 ref. (Q27, Fe)

769-Q. Creep of High-Purity Copper. William D. Jenkins and Thomas G. Digges. *Journal of Research of the National Bureau of Standards*, v. 45, Aug. 1950, p. 153-173.

Creep tests were made at 110, 250, and 300° F. on annealed oxygen-free high-conductivity Cu. 14 ref. (Q3, Cu)

770-Q. Thermal-Shock and Other Comparison Tests of Austenitic and Ferritic Steels for Main Steam Piping. W. C. Stewart and W. G. Schreitz. *Transactions of the American Society of Mechanical Engineers,* v. 72, Oct. 1950, p. 1043-1055; discussion, p. 1055-1060.

Thermal-shock tests of 6-in. pipe-and-valve assemblies, representing both austenitic and ferritic steels in 80 and 160 schedules. The procedure was devised to simulate conditions resulting from carry-over of boiler feedwater into main steam lines operating at 900 or 2000 psi. and 1050° F. Other test procedures include cyclic deflection tests of full-size mock-ups. Each assembly was subjected to 4000 or more deflections corresponding to expansion cycles that would occur on heating up a piping system from room temperature to 1050° F. once every two days for approximately 20 years. Laboratory stress-rupture, tensile, and fatigue tests were also conducted on the same materials, and results correlated with those of thermal-shock testing. (Q general)

771-Q. Photo-Elasticity: An Aid to Welded Design. A. Swindells. *Welding,* v. 18, Oct. 1950, p. 426-436.

The principles of photo-elasticity and its application to design problems. 23 ref. (Q25, K general)

772-Q. Summarized Proceedings of a Conference on Stress Analysis, London, 1950. E. K. Frankl. *British Journal of Applied Physics,* v. 1, Oct. 1950, p. 241-251.

Conference of the Stress Analysis Group of The Institute of Physics held in London, Apr. 3-5, 1950. Sessions were devoted to: Development work on a brittle lacquer suitable for experimental stress analysis; use of models in structural work; application of experimental stress analysis methods to soil mechanics problems; recent developments in photo-elasticity; and application of experimental stress analysis methods in the motor industry. (Q25)

773-Q. Considerations on the Relationship Between Stress and Strain in Plastic Metals. (In English.) J. H. Palm. *Metalen,* v. 5, Sept. 1950, p. 9-14.

Derivation of a recently developed stress-strain formula for isothermal homogeneous deformation in uniaxial tension or compression is further elucidated and extended on the basis of energy considerations. New methods for the determination of its constants are given. A formula, developed by Mazzoleni and based on partly different assumptions, as well as similar improved formulas, are discussed. (Q27, Q28)

774-Q. Influence of Hydrogen on Elasticity of Iron and Steel. (In French.) Paul Bastien and Pierre Azou. *Comptes Rendus* (France), v. 231, July 10, 1950, p. 147-148.

Experimental investigation, hydrogen being introduced into iron or very mild steel by electrolysis or other means. Analysis of the results indicates that the influence of hydrogen on elastic properties is only slight and of secondary importance compared to effects on plastic deformation leading to fracture. (Q21, CN)

775-Q. Crystalline Interaction and the Brittleness of Metals. (In French.) Pierre Laurent and Michel Eudier. *Revue de Métallurgie,* v. 47, Aug. 1950, p. 582-587; discussion, p. 587-588.

Discussed in the light of the theory of pseudo-isotropic media. Method of calculation of crystalline interaction and modulus of elasticity of pseudo-isotropic polycrystals. Results, particularly in their application to study of brittleness of metals. (Q23, Q21, M26)

776-Q. Study of the Shape of Tensile Test Curves for Metals and Their Physical Interpretation. (In French.) Ch. Crussard and B. Jaoul. *Revue de Métallurgie,* v. 47, Aug. 1950, p. 589-600; discussion, p. 600.

Theoretically analyzes different sections of the tensile test curves of metals, using the relation between stress and elongation developed by Lacombe during his study of creep. Physical meaning of the individual sections is indicated. 10 ref. (Q27)

777-Q Stress-Deformation Curves for Light Alloys. (In French.) M. Renouard. *Revue de Métallurgie,* v. 47, Aug. 1950, p. 614-618.

Analyzes curves for AU4G, AG3, AG6, and several duralumin alloys. Essential character of the curves is variation of stress with log. deformation in the interval between 0.01 and 2.0. (Q24, Al)

778-Q. Static Testing and Calculation of Spot-Weld Properties Under Shear-Tensile Stress. (In German.) H. Zschokke and R. Montandon. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 16, Sept. 1950, p. 257-271.

Test procedures. Shows that optimum conditions for spot welding depend on properties and thickness of the material, all of which can be mathematically formulated. Method of calculating shear strength. Results obtained with carbon and stainless steels, Al, and Al alloys. 15 ref. (Q2, Q27, K3, CN, SS, Al)

779-Q. Applied Theory of Plastic Deformation of Rods. (In Russian.) Yu. I. Yagn and E. N. Tarasenko. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, July 21, 1950, p. 471-474.

Mathematical analysis. (Q23)

780-Q. The Fracture Process in Plastic Metals. (In Russian.) Ya. B. Fridman and T. K. Zilova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, Aug. 1, 1950, p. 697-700.

Study of the process from its initial stages to the point of failure, using a macroscopic method. A mesh design impressed into the specimen by a rolling process is used to follow the stages of deformation. Application to the steel designated as "40KhNMA." (Q26, ST)

781-Q. Internal Stresses in Semi-finished and Finished Brass Products. (In Czech.) Petr Skulari. *Hutnické Listy,* v. 5, July 1950, p. 265-274.

Applying his own theory of the origin of internal stresses, the author shows that the cause of cracking of brass—either spontaneous or during working—is internal stress of the second order arising between individual crystals because of size differences. On the basis of experiments, it is concluded that annealing treatment based on the type of brass and its reduction is the only way to remove harmful internal stresses. (Q25, Cu)

782-Q. Origin and Cause of Coarse-Grained Intercrystalline Fractures in Certain Alloy Steels. (In Czech.) Vladimir Koselev. *Hutnické Listy,* v. 5, Aug. 1950, p. 309-316.

Defines intergranular fracture and its origin. The relation between intergranular fracture and microstructural changes occurring during cooling from a high temperature were studied. Also, a fractographic study was made of fractures formed under various conditions. Concludes that the tendency to intergranular fracture is a transitory phenomenon appearing in a certain production phase and does not necessarily indicate an inherent material defect. Work was done on a steel containing 0.45% C and 2% Ni; some work on 18-8 stainless and on steels whose carbides were stabilized with vanadium. 27 photomicrographs. (Q26, AY)

783-Q. Effects of Certain Addition Agents Upon the Frictional and Wear Characteristics of Powder Metallurgy Bronzes. J. H. Dedrick. *ASTM Bulletin,* Oct. 1950, p. 46-50.

An analytical study to determine the specific effect of addition agents to a basic powder-metallurgy bronze, on coefficient of friction and wear rates, when running against steel. Primary components made from powders or otherwise were tested. In addition, binary and ternary combinations were studied in order to interpret the behavior of the more complex compositions now used industrially. (Q9, Cu)

784-Q. Statistical Properties of Fatigue Data on 24S-T Aluminum Alloy. A. K. Head. *ASTM Bulletin,* Oct. 1950, p. 51-53.

Results of rotating cantilever fatigue tests of 185 specimens of 24S-T Al alloy with seven different surface finishes were used to test four hypotheses on the constancy of scatter at different applied stresses. None of the four hypotheses adequately fits the data. (Q7, Al)

785-Q. The Effect of Nitrogen on Brittle Behavior of Mild Steels. G. H. Enzian and G. J. Salvaggio. *Welding Journal,* v. 29, Nov. 1950, p. 537s-544s.

Investigation showed that the effect of N may not be as pronounced as previously indicated. In steels with low Mn-C ratios, little or no change in brittle behavior was found with N variations within the range normally obtained by various openhearth practices. Steels with higher Mn-C ratios exhibited, in general, somewhat better properties, but these were more susceptible to variation with change in N content. Comparisons of tests and criteria used to determine transition temperatures. A good correlation was found between ductility transition temperature and sensitivity to cold work. 21 ref. (Q23, CN)

786-Q. Stresses Around a Spot Weld Under Static and Cyclic Loads. Georges Welter. *Welding Journal,* v. 29, Nov. 1950, p. 565s-576s.

Distribution of stresses was studied as a function of applied static tension loads, using mild steel and Alclad 24S-T sheet. A new type of measurement was made of stresses at the inside surfaces of the joints. Technique and results. (Q25, K3, CN, SS, Al)

787-Q. Properties of Nickel Silvers. *Nickel Bulletin,* v. 23, July 1950, p. 122-125.

Physical and mechanical properties of nine alloys. Equilibrium diagrams. (Q general, P general, M24, Cu)

788-Q. How To Evaluate Deep Drawing Quality Steel. S. Epstein and J. W. Frame. *Iron Age,* v. 166, Nov. 9, 1950, p. 88-92.

Use of a large bulge test, similar to the Olsen cup test, but very much larger. In this way uniform elongation can be measured directly and the sheet is tested transversely as well as longitudinally. The new test is said to come closer to evaluating drawing quality than those used heretofore. Effects of microstructures, inclusions, and alloy residuals on drawability. Bulge-test results for two typical lots are correlated with drawability. (Q23, CN)

789-Q. Hydrogen Embrittlement of SAE 1020 Steel. J. B. Seabrook, N. J. Grant, and Dennis Carney. *Journal of Metals,* v. 188, Nov. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers,* v. 188, 1950, p. 1317-1321.

Hot rolled SAE 1020 machined into tensile-test bars was cathodically charged with hydrogen. Vacuum tin-fusion analysis provided accurate values of hydrogen. True stress-true strain tensile tests with and without

aging of the test bars and at various strain rates indicate the role of hydrogen as an embrittling agent. 13 ref. (Q23, CN)

790-Q. A Simple Torsion Pendulum for Measuring Internal Friction. M. E. Fine. *Journal of Metals*, v. 188, Nov. 1950; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 188, 1950, p. 1322.

Equipment, and data for several nonferrous alloy wires. (Q22, EG-a)

791-Q. Fatigue Weakness of Surfaces. J. O. Almen. *Product Engineering*, v. 21, Nov. 1950, p. 117-140.

Shortcomings in current testing procedures and concepts that should be corrected by careful analysis and evaluation of weakness of the surfaces of materials in fatigue. Theory and practice of shot peening, peening while the material is being stressed, measurement of residual stress, prestressing, effect of removal of stress raisers, residual stress induced by mechanical operations, by thermal treatment, by case-hardening, by nitriding, and by carburizing. 35 ref. (Q7, G23)

792-Q. Variation of Amplitude-Dependent Internal Friction in Single Crystals of Copper With Frequency and Temperature. Arthur S. Nowick. *Physical Review*, ser. 2, v. 80, Oct. 15, 1950, p. 249-257.

Quantities are introduced which express the dependence of internal friction and of Young's modulus on strain amplitude, and it is shown that these quantities are significant measures of the properties of a crystal. Measurements made between −60 and 33° C. show that observed internal friction can be expressed as the product of a function of temperature and a function of amplitude alone. The data also indicate that internal friction and elastic modulus are frequency-independent when the structure sensitivity of the material is taken into account. The results are considered in terms of a mechanism of relaxation by which dissipation is controlled through a rate process; and one of simple hysteresis, by which the stress-strain loop is independent of the rate of traversal. Shows that the latter mechanism gives much better agreement with experimental facts. 10 ref. (Q22, Q21, Cu)

793-Q. Residual Stresses in Magnesium: Technique and Results. George H. Found. *Proceedings of the Society for Experimental Stress Analysis*, v. 8, no. 1, 1950, p. 1-13.

A measuring method which minimizes and segregates the effect on residual stress of cold working in the cutting operation. It was found that differential residual stresses in castings are of maximum magnitude in the as-cast state and seem to be reduced in inverse proportion to the temperature of heat treatment. In heat treated castings they appear to be of low magnitude with respect to safe loading-stress ranges. (Q25, Mg)

794-Q. Letter to the Editor. Edward Wenk, Jr. and Thomas D. Tuft. *Proceedings of the Society for Experimental Stress Analysis*, v. 8, no. 1, 1950, p. 14-16.

Technique for protecting wire-resistance strain gages when located under water at high pressure. The primary element consists of a thin rubber sheet which is cemented over a strain gage after the gage has been prepared in the usual fashion. (Q25)

795-Q. An Industrial Method for the Determination of Residual Stresses. W. Soete and R. Vancrombrugge. *Proceedings of the Society for Experimental Stress Analysis*, v. 8, no. 1, 1950, p. 17-26; discussion, p. 26-28.

A method similar to that of Mathar, but using electrical resistance wire strain gages instead of dial extensometers, which eliminates unsteady and irregular readings during the drilling operation. (Q25)

796-Q. The Influence of Bolt Tension and Eccentric Tensile Loads on the Behavior of a Bolted Joint. T. J. Dolan and J. H. McClow. *Proceedings of the Society for Experimental Stress Analysis*, v. 8, no. 1, 1950, p. 29-43.

Strains developed in bolted joints loaded with forces applied perpendicular to the surfaces of contact of the two members joined. Derives an approximate expression for the stresses developed in the critical areas. Laboratory study of strains in a conventionalized model. 11 ref. (Q25, K13)

797-Q. A Deflection Rate Method for Determining Structural Yield. J. M. Coe. *Proceedings of the Society for Experimental Stress Analysis*, v. 8, no. 1, 1950, p. 45-50.

A new method of treating deflection readings to determine the proportional limit in a specimen under static loads. It is especially adapted to testing major components of an airframe. It permits rapid evaluation of data from a large number of deflection readings. (Q21)

798-Q. The Method of Oblique Incidence in Photoelasticity. D. C. Drucker. *Proceedings of the Society for Experimental Stress Analysis*, v. 8, no. 1, 1950, p. 51-66.

Some available methods for the analysis of three-dimensional states of stress, in particular, the photoelastic "freezing" technique. Problems of accuracy for the principal plane and the two-dimensional case. The procedure using a single oblique photograph is compared with use of double oblique incidence. Also an alternative double oblique incidence procedure is presented in which retardation values alone accurately determine the magnitude of the principal stress differences. 11 ref. (Q25)

799-Q. A Frame for Testing Structural Models. Edward Wenk, Jr. *Proceedings of the Society for Experimental Stress Analysis*, v. 8, no. 1, 1950, p. 67-78.

Test frame developed and in use at David Taylor Model Basin, which provides for multidirectional application of forces at a plurality of points so that effects of simultaneous service loadings may be duplicated. Includes examples of application. (Q)

800-Q. Tests of Columns Under Combined Thrust and Moment. Lynn S. Beedle, Joseph A. Ready, and Bruce G. Johnston. *Proceedings of the Society for Experimental Stress Analysis*, v. 8, no. 1, 1950, p. 109-132.

Test equipment developed to apply various desired combinations of axial load and end moments to 8, 12, and 16-ft. steel columns. Behavior of test columns under load was determined by using four measuring techniques: taut-wire and mirror deflection gages, level bars, SR-4 strain gages, and whitewash. The moment-producing thrust was measured by aluminum tube dynamometers. (Q25, CN)

801-Q. Characteristics of Electric Strain Gages at Low Temperatures. E. E. Day. *Proceedings of the Society for Experimental Stress Analysis*, v. 8, no. 1, 1950, p. 133-142.

See abstract of "Effects of Low Temperatures on Electric Strain Gages", *Trend in Engineering at the University of Washington*, item 143-Q, 1950. (Q25)

802-Q. A Method for the Determination of Initial Stresses. C. Riparbelli. *Proceedings of the Society for Experimental Stress Analysis*, v. 8, no. 1, 1950, p. 173-196.

The method consists of introducing a circular discontinuity in the surface of a body possessing residual stress, and measuring by means of electric strain gages the resulting stresses occurring in the vicinity of the hole. Includes mathematical analysis. (Q25)

803-Q. The Design of a High-Speed Polariscope. J. J. Baruch. *Proceedings of the Society for Experimental Stress Analysis*, v. 8, no. 1, 1950, p. 197-204.

A small, portable photo-elastic polariscope for application to dynamic or static loading conditions. Photoelastic stress patterns are compared with those of the standard polariscope for static conditions. Illustrations of dynamic applications. (Q25)

804-Q. Deformation Textures in Face-Centred Cubic Metals. E. A. Calnan and C. J. B. Clews. *Philosophical Magazine*, v. 41, Nov. 1950, p. 1085-1100.

From a qualitative treatment of the deformation of polycrystalline aggregates it was possible to derive for face-centered cubic metals, a tensile stress-elongation curve in satisfactory agreement with experiment and with that previously derived by Taylor; and tension, compression, rolling, and wiredrawing textures in reasonable agreement with observation. An attempt is made to give a clearer physical explanation of the deformation process. It may be possible to extend the treatment to body-centered cubic metals. 11 ref. (Q24)

805-Q. A Theory of the Plastic Bulging of a Metal Diaphragm by Lateral Pressure. R. Hill. *Philosophical Magazine*, v. 41, Nov. 1950, p. 1133-1142.

Explicit formulas are obtained for the stresses which appear during the above process. The predicted influence of work hardening on shape of the profile, and on relation between polar strain and curvature, agrees well with experimental data. A simple expression is developed for instability strain. (Q25)

806-Q. Deformation Texture of Drawn Face-Centred Cubic Metal Wires. Walter R. Hibbard. *Journal of the Institute of Metals*, v. 77, Aug. 1950, p. 581-584.

Theoretical considerations indicate that the deformation texture of drawn face-centered-cubic metal wires should be a single orientation rather than the double orientation previously reported. X-ray analyses of wires drawn 98% show essentially a single texture for Pb, Ni, Cu, Al, Ag, and Au, in support of this theory. 16 ref. (Q24, Pb, Ni, Cu, Al, Ag, Au)

807-Q. The Correlation Between Different Hardness Numbers for Grey Cast Iron. (In English.) Jan Wozniacki. "International Gieterij Congres 1949—Amsterdam", p. 162-170; discussion, p. 170.

Revises, completes, and converts existing tables, formulas, and nomograms using Brinell hardness numbers from 120 to 230. (Q29, CI)

808-Q. The Influence of Oxygen, Nitrogen and Carbon on the Impact Strength of Iron and Steel. (In English.) J. D. Fast. "International Gieterij Congres 1949—Amsterdam", p. 171-181; discussion, p. 181-183.

See abstract of "Investigations Into the Impact Strength of Iron and Steel", *Philips Technical Review*, item 292-Q, 1950. (Q6, Fe, ST)

809-Q. Damping Capacities of S.A.E. 1020 and 2320 Steels. Lester Tarnopol and James R. Morgan. *Transactions of the Indian Institute of Metals*, v. 1, June 1948, p. 55-69.

Damping capacities were studied as a function of maximum fiber stress after various anneals and case carburization. It was found that machining increases the damping while subsequent aging or annealing decreases damping. Changes in

damping capacity observed at high stress could be accounted for by assuming that plastic slip was an important factor. (Q8, CN, AY)

810-Q. Effect of Rust-Preventive Silumin Coatings in the Interior of Riveted Joints of ST52 on Their Tensile-Fatigue Strength. (In German.) Otto Graf. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 92, Sept. 11, 1950, p. 747.

Experimental results on joints in structural steel. (Q7, L15, CN)

811-Q. Wire Fracture and Its Relationship to the Decision as to When to Discard Cables on Hoisting Equipment. (In German) O. Sander. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 92, Sept. 21, 1950, p. 763-766.

Rules for deciding when to discard cables, based on breakage of a certain number or percentage of individual wires within a specified length of cable; also the factors that cause the wire "breaks" and their effects on the tensile and bending strength of a given cable. (Q26, CN)

812-Q. Behavior of Steel at Elevated Temperatures. Survey of Literature for the Years 1948 and 1949. (In German.) Anton Pomp. *Stahl und Eisen,* v. 70, Aug. 31, 1950, p. 791-794; Sept. 14, 1950, p. 848-853.

Mechanical-test apparatus. Second part charts and tabulates elevated-temperature properties of various stainless and high-alloy steels. 65 ref. (Q general, AY, SS, SG-h)

813-Q. Testing the Wear Resistance of Surfaces. (In German.) H. Meincke. *Metalloberfläche,* sec. A, v. 4, Oct. 1950, p. 145-151.

Frequently used methods of materials testing (such as hardness testing) are unsuited to the measurement of wear resistance. Describes a method of testing wear resistance as a suggestion for standardizing testing practices under comparable conditions. Equipment used. (Q9)

814-Q. Recent Results With Respect to Work-Hardening During Plastic Deformation of Crystals. I. Shear Stressing of Long Crystals. (In German.) Fritz Röhm and Albert Kochendörfer. *Zeitschrift für Metallkunde,* v. 41, Aug. 1950, p. 265-272.

Three proposed explanations were studied experimentally. Apparatus and procedure. Results for 99.998% Al are compared with those of other investigators. 24 ref. (Q24, Al)

815-Q. The Technological Properties of Mg-Ce-Zn Cast Alloys. (In German.) G. Siebel and H. Vosskühler. *Metall,* v. 4, Sept. 1950, p. 370-374.

Shows that 0.7-1.5% Ce added to Mg-Zn alloys materially increases the strength properties and density of sand and chill castings and that malleable Mg-Ce-Zn alloys have excellent strength properties, especially when age hardened at elevated temperatures. Effects of Fe and Si content on structure and of Ce on density; also effects of Ag, Ca, Sn, Mn, Al, Zr, and Be. (Q23, P10, Mg)

816-Q. Evaluation of Fatigue-Test Data in Materials Testing. (In German.) W. Späth. *Metall,* v. 4, Sept. 1950, p. 374-377.

Proposes that, in Wöhler diagrams, stress be plotted as a function of rate of fracture. By this method, the desired critical stress is clearly indicated by the intersection of a straight line and the ordinate. Practical application to steel, Pb alloys, and Al alloys. (Q7, ST, Pb, Al)

817-Q. Scaffolds of Light Metal. (In German.) O. Stockmar. *Metall,* v. 4, Oct. 1950, p. 421-422.

Application of Al alloys. Tables and graphs show mechanical properties. (Q general, T26, Al)

818-Q. Estimation of the Properties of Cast Iron by Chill Tests. (In Japanese.) Nobuaki Ogura. *Journal of the Casting Institute of Japan,* v. 22, no. 6, 1950, p. 1-9.

Small wedge-shaped castings were used as test pieces for the relationships between chilled thickness, chemical compositions, and tensile strengths. 10 ref. (Q27, CI)

819-Q. Flexure Tests on Copper. *Iron Age,* v. 166, Nov. 16, 1950, p. 90.

Special tests made by Revere Copper and Brass, to determine the best design of copper expansion joints for concrete slabs and walls, masonry walls, and other places where weather conditions require provision for alternate expansion and contraction. (Q5, Cu)

820-Q. Causes and Prevention of Drill Collar Failures. Stanley C. Moore. *Drilling,* v. 12, Nov. 1950, p. 28, 30, 85.

Practically all drill-collar failures noted in the field are the result of fatigue at the connections—either simple fatigue in the case of the pins, or corrosion fatigue in the case of the boxes. Recommended operating procedures and design. Use of a Mg ring in the drill-collar box to prevent corrosion in the bore near the ring, by electrochemical action. (Q7, R10, T28, ST, Mg)

821-Q. Explosive Forces Widen Metallurgical Studies. *Steel,* v. 127, Nov. 20, 1950, p. 98-99. Based on U. S. Navy, Bureau of Ordnance, report by John S. Rinehart.

How extreme pressures, often as much as 5,000,000 psi., furnished by explosive charges, are being used to help shed more light on the resistance of metals and mechanical systems to forces accompanying aircraft landings and machine impact. (Q25)

822-Q. Surface Effects in Creep of Cadmium Crystals. D. J. Phillips and N. Thompson. *Proceedings of the Physical Society,* v. 63, sec. B, Nov. 1, 1950, p. 839-847.

A recording rate-of-strain meter was used to investigate changes in creep rate when the chemical environment of a stressed cadmium crystal is altered. Experiments were made with aqueous solutions of a number of inorganic salts of Cd. Measurements were also made of the effect of very thin films, formed by immersion in distilled water. When the films were removed with dilute H_2SO_4, a sudden small strain increment was observed, the magnitude of which depended on film thickness. Possible explanations. 18 ref. (Q3, Cd)

823-Q. Creep in a Precipitation-Hardened Alloy. M. Davis and N. Thompson. *Proceedings of the Physical Society,* v. 63, sec. B, Nov. 1, 1950, p. 847-860.

Measurements were made of the creep shown by polycrystalline wires of a hardened alloy (Cu + 3% Ag) both at room temperature and 90° K. Results are interpreted in terms of the Mott-Nabarro theory of transient creep. Agreement between theory and experiment is qualitatively satisfactory. (Q3, Cu)

824-Q. The Creep of a Nominally Isotropic Magnesium Alloy at Normal and Elevated Temperatures Under Complex Stress Systems. A. E. Johnson. *Metallurgia,* v. 42, Oct. 1950, p. 249-262.

Purpose of the investigation was to examine the nature of the creep of an initially isotropic cast Mg alloy at temperatures of 20 and 50° C., and under general stress systems. Some 40-50 tests consisting of pure tensile, pure torsion, and complex-stress creep tests were performed. Results are analyzed, and equations for the stress-strain relations over the above temperature range are developed. 16 ref. (Q3, Mg)

825-Q. A Study of the Mechanism of Fracture of Metals. (In French.) Georges A. Homes and Jacques Gouzou. *Revue de Métallurgie,* v. 47, Sept. 1950, p. 678-692.

Experimentally investigated for Zn and mild steel. Influencing factors, such as chemical and crystallographic nature of material, degree of purity, structural state, temperature, and rate of application of load. The mechanism of fracture is tentatively explained. (Q26, Zn, CN)

826-Q. Results of Research on Stress Patterns Conducted at Instito di Costruzione di Macchine, University of Palermo. (In Italian.) Giuseppe Manzella. *Metallurgia Italiana,* v. 42, July 1950, p. 249-254.

Principal results of work done from 1938 to 1949 on stress patterns in shafts subjected to torsion, and in perforated plates. The first were studied by use of electrical analogies; the second by photo-electric methods. 11 ref. (Q25)

827-Q. Short-Time Endurance Tests on Fe-Cr-Al Resistor Alloys. (In Italian.) M. Signora and F. Baldi. *Metallurgia Italiana,* v. 42, July 1950, p. 255-260.

Results of a series of tests, based on ASTM B76-39 specifications, made to determine optimum procedures. It was found inconvenient to test to rupture. Instead the tests are considered completed when electrical resistance has increased by a given amount. The three alloys tested contained 19.13-24.50% Cr and 2.15-4.21% Al. (Q7, P16, SG-q, Fe)

828-Q. Experimental Research on a Model of a Horizontal Aluminum Tank. (In Italian.) C. Castiglia and F. Levi. *Alluminio,* v. 19, no. 4, 1950, p. 319-323.

Use of a 1/5th-scale model of a particular type of tank. Strain gages were used to study stresses and strains encountered. Calculations necessary to convert the results to those valid for the full-sized tank. (Q25, T26, Al)

829-Q. Effect of Silicon on the Mechanical Properties and Micrographic Structure of Alcoa 195 Alloy. (In Italian.) F. de Thierry. *Alluminio,* v. 19, no. 4, 1950, p. 334-339.

Amount of elongation under different temperatures and loads was the principal mechanical property studied. The alloy contains 4-5% Cu, and not more than 1.50% Si, 0.80% Fe, 0.30% Mn, and 0.20% Ti. (Q27, M27, Al)

830-Q. Strength Tests on Completely Welded Railroad Passenger Cars of Light Steel Construction. (In French and German.) E. R. Steiner. *Zeitschrift für Schweisstechnik: Journal de la Soudure,* v. 40, Oct. 1950, p. 169-177.

Tests made to determine mechanical strength. (Q23, T23, CN)

831-Q. Comparison of Results of Hardness Measurements. (In Polish.) J. Wozniacki. *Prace Badawcze Glownego Instytutu Metalurgii i Odlewnictwa,* v. 2, no. 3, 1950, p. 197-211.

Theoretical survey of the concept of hardness; compares experimental results from the literature. Test variables which have an influence on hardness number, i.e., deformation of penetrator and indentation, angle deformation, size of loading of penetrator, etc. Possibility of comparison of hardness numbers obtained by the Brinell, Ludwik, and Vickers methods. 14 ref. (Q29)

832-Q. Schematic Diagrams for the Mechanical State. (In Russian.) S. I. Gubkin. *Izvestiya Akademii Nauk SSSR* (Bulletin of the Academy of Sciences of the USSR), Section of Technical Sciences, Aug. 1950, p. 1165-1182.

Two types of diagrams which form a firm basis for classification

of mechanical states, mechanisms of plasticity, and basic methods of press working of metals. Special features of each type of diagram. Theoretical derivations are based on tensor analysis. (Q23, G1)

833-Q. Determination of Local Wear by Use of Oval Depressions. (In Russian.) M. M. Khrushchov and E. S. Berkovich. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, Aug. 11, 1950, p. 909-911.

Method in which an oval depression is made in the part subject to frictional wear. Decrease in depth of the groove is taken as a basis for calculation of the wear. Details of procedure. (Q9)

834-Q. Plasticity of High-Temperature Modifications of Polymorphous Metals. (In Russian.) E. M. Savitskii. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, Aug. 11, 1950, p. 945-947.

Studied theoretically and experimentally for a large number of metals. Crystalline modifications at high and low temperatures are described qualitatively for Li, Cs, Be, Ca, Se, La, Cs, Pr, Nd, Ti, Zr, Hf, Cr, U, Mn, Fe, Co, Tl, and Sn. As a rule, the high-temperature modification has the greatest plasticity. (Q23)

835-Q. Concentration of Deformation and Stresses During Large Plastic Deformations. (In Russian.) Ya. B. Fridman and T. K. Zilova. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, Aug. 21, 1950, p. 1185-1188.

Studies using the method of a rolled-on mesh pattern. Local deformations are determined from distortions of the pattern. Coefficient of deformation concentration was calculated to be the ratio of maximum shear to mean shear. Application of the results to the study of stress concentration in different types of test specimens (plain and notched) is indicated. (Q24, Q25)

836-Q. Influence of Surface-Active Substances on Fatigue Strength of Steel. (In Russian.) G. V. Karpenko. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, Aug. 21, 1950, p. 1225-1228.

Two steels (20X and 40X) subjected to different heat treatments were investigated during contact with the following media: air, water, 2% $C_8H_{17}OH$ in water, lubricating oil + 2% oleic acid, and castor oil + 2% linoleic acid. (Q7, CN)

837-Q. Problem of Formation of Fatigue Microfissures. (In Russian.) G. V. Karpenko. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Sept. 1, 1950, p. 95-98.

Theoretical explanation, based on Rebinder's theory (1947). Results of experimental investigation of effects of surface-active agents on fatigue strength of carbon steel (20X). (Q7, CN)

838-Q. Dependence of Microhardness of Structural Parts on the Composition of Some Binary Cast Alloys. (In Russian.) A. M. Korol'kov and E. S. Kadaner. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Sept. 11, 1950, p. 271-274.

Experimentally investigated for Al-Ni, Pb-Sb, Al-Mn, and Sn-Sb alloys, in order to determine, in each case, which constituent has the major effect on hardness. (Q29, Al, Ni, Pb, Sb, Mn, Sn)

839-Q. (Book) **Physical and Mechanical Characteristics of Materials for Pressure Vessels: an Annotated Bibliography. Vols. I-IV. Unpaged. Pressure Vessel Research Committee of the Welding Research Council,** 29 W. 39th St., New York 18, N. Y.

Periodical literature on flow and fracture of metals in general, mechanical properties of ferrous materials for pressure vessels, and test procedures. The bibliography is in the form of an abstract file. Each of approximately 3000 items is reproduced within a 4 x 6 card outline, two to a sheet, printed on one side only. Each includes title, authors, primary reference, and any secondary references (republications, abridgments, translations, etc.). Most of the abstracts are reproduced from one of the well-known abstract journals. Vol. I comprises a subject-index file of the abstracts in the subsequent three volumes. Vol. II covers literature published in 1937 and 1938; Vol. III, 1939-1943; and Vol. IV, 1944-1947. (Q general, T25, ST)

840-Q. (Book) **Theory of Flow and Fracture of Solids. Vol. 1. Ed. 2.** A. Nadai. 572 pages. 1950. McGraw-Hill Book Co., 350 W. 42nd St., New York 18, N. Y. $10.00.

New chapters discuss the theories of simple and composite substances based on the types of strains—elastic, permanent, or a combination of both—and on the types of laws of deformation postulated. Treatment includes metals. Footnote references. (Q24, Q26)

841-Q. (Book) **An Introduction to Experimental Stress Analysis.** George Hamor Lee. 319 pages. 1950. John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. $5.50.

Surveys all aspects of the subject. References for more advanced study follow each chapter. (Q25)

842-Q. (Book) **The Properties of Aluminium and Its Alloys. Ed. 3.** 55 pages. Information Bulletin No. 2, 1949. Aluminium Development Association, 33 Grosvenor St., London W.1, England. 1s.

Physical and mechanical properties of Al casting and wrought alloys, durability, and methods of working alloys in relation to properties. 15 extensive tables of data. Average weights of Al alloys in standard forms and correlations of British aircraft and other standards are presented in appendixes. (Q general, S22, Al)

843-Q. (Book) **Neuere Festigkeitsprobleme des Ingenieurs.** (Modern Strength-of-Materials Problems of Engineers). K. Marguerre. 253 pages. 1950. Springer-Verlag, Berlin, Germany. 25.50 DM.

Experimental methods of stress determination, stress problems which involve the theory of elasticity, an introduction to vibration mechanics, solution of vibration problems, and stability problems having a close relation to the problem of vibration. (Q21, Q23, Q25)

R

CORROSION

416-R. Clues to Bacterial Corrosion. Frank E. Kulman. *American Gas Association Monthly,* v. 32, Oct. 1950, p. 26, 30.

As applied to ferrous and copper pipes. (R1, ST, Cu)

417-R. Studies of Copper Surfaces by Low Temperature Adsorption Isotherms. T. N. Rhodin, Jr. *Journal of the American Chemical Society,* v. 72, Oct. 1950, p. 4343-4348.

True surface areas of metal surfaces as small as 10 sq. cm. were measured with an error of 6% from low-temperature adsorption isotherms using a specially designed vacuum microbalance technique. This method is of special value in determining the average thickness of corrosion films formed by reaction of gases or liquids with solids. Progressive oxidation of a rough polycrystalline Cu surface decreased the surface area to a point where the roughness factor approached unity. (R2, S15, Cu)

418-R. How Zinc, Aluminum Differ: An Etch Formula for Aluminum Plates. *Modern Lithography,* v. 18, Oct. 1950, p. 57. From material prepared for "Research Progress" published by Lithographic Foundation.

Compares corrosion and surface-active properties of above as applied to lithographic plates. (R5, P10, T9, Al, Zn)

419-R. Rust Formation and the Action of Red Lead; a New Investigation. Manfred Ragg. *Paint, Oil & Chemical Review,* v. 113, Oct. 26, 1950, p. 21-22, 26.

Experimental work in which voltages occurring in a model Fe-C cell were determined as an indication of the magnitude of those which occur in "local cells" during corrosion of iron and steel, and to help clarify the mechanism of action of red lead. The model cell consisted of an iron rod 7.8 mm. in diam. and a carbon electrode immersed in a 0.5% solution of NaCl. In later experiments, a dispersion of red lead was added. (R1, L26, Fe)

420-R. Underground Corrosion Tests on Aluminum Alloys at Wright-Hargreaves Mine. Hugh P. Godard and K. Winslow. *Canadian Mining and Metallurgical Bulletin,* v. 43, Oct. 1950, p. 552-557; discussion, p. 557; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 53, 1950, p. 390-396; discussion, p. 396.

A number of panels of various Al alloys in different combinations and secured by steel and three types of Al rivets were exposed underground at two locations in a Northern Ontario gold mine for two years and then examined to determine the extent of corrosion. Results indicate Alcan 65S-T to possess considerable advantages over 17S-T. (R8, Al)

421-R. Use of a Magnetic Field in Detecting Corrosion Currents. F. Blaha. *Nature,* v. 166, Oct. 7, 1950, p. 607.

When a salt solution is placed on the lower pole of a powerful electromagnet, it rotates clockwise or counterclockwise depending on direction of the field. From velocity of rotation, a rough estimate of strength of the current flowing can be obtained. (R11)

422-R. Temporary Corrosion Preventives for Aviation Uses and Methods of Testing Them. E. W. J. Mardles and J. Mason. *Journal of the Institute of Petroleum,* v. 36, Aug. 1950, p. 475-487; discussion, p. 504-542.

Includes test methods. Results obtained by the Norma-Hoffman Bomb Oxidation Test. (R10)

423-R. American Methods of Testing Temporary Corrosion Preventives. C. F. McCue and E. R. Blane. *Journal of the Institute of Petroleum,* v. 36, Aug. 1950, p. 487-494; discussion, p. 504-542.

A critical review. (R10)

424-R. Performance Tests, Other Than Corrosion Tests, on Temporary Corrosion Preventives. H. Hollis. *Journal of the Institute of Petroleum,* v. 36, Aug. 1950, p. 495-504; discussion, p. 504-542.

Brief details of methods. Tests used for evaluation of protective properties are not dealt with. (R10)

425-R. Investigation of Oxidation and Corrosion Processes on Metal Surfaces With the Aid of Voltage Measurements. (In German.) H. Neuert and H. Hansel. *Zeitschrift für angewandte Physik*, v. 2, Aug. 15, 1950, p. 319-323.

Using Kelvin's method and gradual voltage changes on the surfaces of Al, duralumin, Zn, Fe, and Pb, it was found that Al and duralumin undergo strong and characteristic changes. Shows that this method can be used to study the resistance of metals to gaseous corrosion. Test results obtained in an acid-vapor atmosphere agree with known corrosion behavior of the respective metals. 17 ref. (R2, R9, R11, Al)

426-R. Formation and Effect of Galvanic Currents. (In German.) L. W. Haase. *Werkstoffe und Korrosion*, v. 1, Aug. 1950, p. 297-299.

Evidence which shows that corrosion of metals is often incorrectly blamed on galvanic action. Claims that corrosion is sometimes caused by solution and deposition of one metal on another metal, the other metal being destroyed by action of the resulting local currents. (R1)

427-R. Evans Cells. A Reply to Masing's Remark on the Theory of Corrosion by Local Currents. (In German.) K. Wickert and H. Wiehr. *Werkstoffe und Korrosion*, v. 1, Aug. 1950, p. 299-302.

A few experiments prove that Masing and Evans' opinions can be experimentally disproved even when Evans cells with low electrolytic and external resistance are used. Evans' experimental results are valid only when reactivity of the electrode surfaces is considered. (R1)

428-R. The Effect of Acid and Neutral Phosphate Solutions on Ingot Iron. II. (In German.) H. Grubitsch. *Werkstoffe und Korrosion*, v. 1, Aug. 1950, p. 303-304.

Results of a study of corrosion of iron containing 0.045% C, 0.056% Si, 0.40% Mn, 0.031% S, and 0.015% P in acid and neutral solutions of NaH_2PO_4. (R5, Fe)

429-R. Appearance and Interpretation of Stress Corrosion in Malleable Aluminum Alloys. (Concluded.) H. Vosskühler. *Werkstoffe und Korrosion*, v. 1, Aug. 1950, p. 310-320; Sept. 1950, p. 357-366.

Effects of annealing above the solubility temperature; of alloying additions; of harmful impurities; and of structural anisotropy. Sept. issue: Stress-corrosion caused by electrochemical and mechanical action and by a combination of the two. Distinguishing features of stress corrosion, intercrystalline corrosion and laminar corrosion. (R1, Al)

430-R. Electrochemical Character of Metallic Corrosion in Liquid Dielectrics. (In Russian.) L. G. Gindin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, July 21, 1950, p. 515-518.

Corrosion in a hydrocarbon solution of fatty acids as a typical example of the above. Results obtained with a Fe-Mg element submerged in a 1.5N iso-octane solution of acetic acid indicate that, contrary to usual assumptions, corrosion in a nonelectrolyte nevertheless has an electro-chemical character. (R7, Fe)

431-R. Amalgamation of Aluminum and Its Alloys in the Presence of Water. (In Czech.) Ferdinand Kralik. *Hutnické Listy*, v. 5, Aug. 1950, p. 326-328.

Influence of the liquid Hg phase on spontaneous disintegration of amalgamated Al. This effect is said to be specially important in Al-Zn-Mg and Al-Zn alloys. Shows how the effect can be used to determine the susceptibility of the alloys to intercrystalline corrosion, and for detection of harmful internal stresses. (R2, Q25, C29, Al)

432-R. Stress Corrosion of Magnesium. *Light Metal Age*, v. 8, Oct. 1950, p. 12-13.

See abstract of "Stress Corrosion of Wrought Magnesium-Base Alloys", Hugh L. Logan and Harold Hessing, *Journal of Research of the National Bureau of Standards*, item 175-R, 1950. (R1, Mg)

433-R. Management's Attitude Toward a Corrosion Control Program. R. B. Wilson. *Gas Age*, v. 106, Nov. 9, 1950, p. 38-40, 60.

How Mississippi Power & Light Co.'s corrosion control program was started, what it has accomplished, advantages realized, and what it has cost. (R general, A4)

434-R. Inhibitor in Stick Form Stops Corrosion in Louisiana Gas Well. G. M. Harper, Jr. *Petroleum Engineer*, v. 22, Nov. 1950, p. B54, B56, B58, B61, B64, B66.

Caliper charts taken from tubing-corrosion surveys of the well; also characteristic caliper charts for tubing having no corrosion, mild corrosion, severe corrosion, and very severe general corrosion. Test coupons and water condensate analyses were also used to determine the extent of corrosive conditions. Since severely corrosive conditions were indicated, proprietary organic stick inhibitors were tried and gave excellent results. (R10, ST)

435-R. ASTM Exposure Test Site Program. *ASTM Bulletin*, Oct. 1950, p. 5-9.

Present status of the Society's work on corrosion and deterioration of a wide variety of metallic and nonmetallic materials. Plans for placing ASTM exposure testing on a firm, long-time basis. (R11)

436-R. Corrosion. The Use of Lead in the Pulp & Paper Industry. Vance P. Edwardes. *Paper Trade Journal*, v. 131, Oct. 26, 1950, p. 18-19, 22-23.

Corrosion resistance in contact with various papermaking solutions. (R5, T29, Pb)

437-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry*, v. 42, Nov. 1950, p. 99A-100A.

Case in which Cb failed to stabilize Type 347 stainless steel. Knife-line intergranular attack occurred immediately adjacent to the welds. Tentative mechanism proposed to explain the situation, based on the effect of temperature on the solid solubility of Cb in 18-8 stainless. (R10, R2, SS)

438-R. Laboratory Corrosion Testing of Chemical-Resistant Paints. R. R. Rogers and W. Dingley. *Finish*, v. 7, Nov. 1950, p. 23-26, 75.

Progress report on Canadian government research program being carried out to obtain performance information on chemical-resistant paints, including a comparison with ordinary paints. Seven commercial paints were applied to steel panels and subjected to various types of exposure. (R11, L26)

439-R. Organic Corrosion Preventive. Charles M. Blair, Jr. *World Oil*, v. 131, Nov. 1950, p. 159-160, 163-164, 166.

Results of using organic corrosion preventives in oil and gas wells. The various types of inhibitors and their specific applications. Methods of introducing the chemicals into the well. Typical case histories. (R10, ST)

440-R. Determination of Current Requirements for Cathodic Protection. Marshall E. Parker. *World Oil*, v. 131, Nov. 1950, p. 253, 256, 258, 260, 264, 267.

Procedure. (R10)

441-R. A Study of Some Metals for Use as Permanent Anodes in Water-Tank Cathodic Protection Systems. A. L. Kimmel. *Corrosion* (Technical Section), v. 6, Nov. 1950, p. 353-358; discussion, p. 358-359.

Since, in water-tank protection systems, ideal conditions do not exist, Faraday's law cannot be used to calculate rate of dissolution of metal. Therefore experiments were made on various commercial metals and alloys used as anodes. These were 99.99% Al, 3S Al, hot-rolled black iron, commercial Ni, monel, Inconel, and Types 302 and 316 stainless steel. (R10, Al, Fe, Ni, SS)

442-R. Design of Anode Systems for Cathodic Protection of Underground and Water Submerged Metallic Structures. E. R. Shepard and Henry J. Graeser, Jr. *Corrosion* (Technical Section), v. 6, Nov. 1950, p. 360-375; discussion, p. 375.

Results of an extensive study of factors involved. (R10)

443-R. A Method of Selecting Protective Coatings for Offshore Drilling Structures. Jack P. Barrett. *Corrosion* (Technical Section), v. 6, Nov. 1950, p. 376-381; discussion, p. 381-383.

Laboratory testing program set up to evaluate protective coatings. To further verify the laboratory results, panels coated with the various painting systems were exposed at a marine location in the Gulf Coast. Correlation was about 90%. Some 30 systems have been tested to date and approximately 60% were totally unsuited for the conditions involved. 20% were of doubtful value, leaving 20% that could be used with more or less effectiveness. (R11, ST)

444-R. Progress Report: The Use of Cathodic Protection in Conjunction With Paint Coatings. W. L. Crosby. *Corrosion* (Technical Section), v. 6, Nov. 1950, p. 383-388.

Corrosion of steel tanks, housing transformers, and network protectors installed in manholes where they are subject to complete or partial salt-water immersion at high tide. Attempts to mitigate this corrosion have led to two main investigations: selection of the best available paint system that can readily be applied; and feasibility of applying cathodic protection in conjunction with this coating. Selection of the best paint system involved laboratory testing of approximately 100 different systems under conditions simulating those encountered in service. The study of cathodic protection in conjunction with a protective coating is still in its initial phases. (R10, R4, ST)

445-R. Deterioration of Diesel Cylinder Liners. F. N. Seller and F. L. LaQue. *Plant*, v. 2, Nov. 1950, p. 38-41.

A peculiar form of corrosion encountered on cast-iron cylinder liners of various types of diesel engines. Suggests possible remedies and urges cooperative research to solve the problem. Ordinary corrosion of liners and crevice corrosion. (R2, CI)

446-R. Adsorbed and Reaction-Product Films on Metals. Herbert H. Uhlig. *Journal of the Electrochemical Society*, v. 97, Nov. 1950, p. 215C-220C.

Effects of gaseous atmospheres on metals, encountered at room and elevated temperatures, during processing, storage, and use. Wetting of iron by mercury, physical adsorption, chemisorption, Cr and the stainless steels, Cl ions and pitting action of hydrogen, passivation, adsorption vs. reaction, and adsorption of metals on metals. 19 ref. (R2, P13)

447-R. Corrosion of Bare Iron or Steel in Sea Water. J. C. Hudson. *Journal of the Iron and Steel Institute*, v. 166, Oct. 1950, p. 123-136.

Results so far obtained by the Corrosion Committee. Presence of mill scale is shown to promote serious pitting. After removal of mill scale, there is little difference in the corrosion rates of ordinary unalloyed ferrous materials, such as mild steel.

ingot iron, or wrought iron. Of a wide range of alloying elements incorporated in a series of low-alloy steels, only two, Cr and Ni, are shown to have any significant effect in reducing corrosion rate. (R4, Fe, CN, AY)

448-R. Intercrystalline Corrosion of Copper-Silicon Alloys Caused by Atmospheric Oxygen. (In German.) Otto Heusler. *Zeitschrift für Metallkunde*, v. 41, Aug. 1950, p. 261-264.

Oxidation of Cu-Si alloys containing 15-40% Si was studied. At higher temperatures, the accumulated heat of reaction may cause spontaneous combustion. Small additions of As, Bi, Ge, Pb, Sn, Tl, or atmospheric moisture accelerate, Be and Zn decelerate, rate of oxidation. The reaction was studied at different temperatures and with addition of 26 different elements. (R2, Cu)

449-R. Observations on the Corrosion of Liquid Pumps. (In German.) W. Katz. *Metalloberfläche*, sec. A, v. 4, Sept. 1950, p. 126.

Case in which Cu was deposited on certain Al bronze pump parts, causing galvanic corrosion, when an impure solution of NaCl and KCl was being pumped. (R1, Cu)

450-R. Corrosion Resistance of Magnesium Alloy Tested. *Iron Age*, v. 166, Nov. 16, 1950, p. 82.

Results of work by National Bureau of Standards on stress-corrosion resistance of six wrought Mg alloys and one clad alloy, in marine and inland atmospheres. (R1, Mg)

451-R. Conservation of Columbium: A Summary of British and American Experience With Stabilized Stainless Steels. *Metal Progress*, v. 58, Nov. 1950, p. 691-708, 742, 744, 746, 748, 750, 752, 754, 756, 758, 760, 762, 764, 766, 768, 774, 776, 778, 780, 782, 784.

In an article, "Conservation of Columbium" in the July issue (item 548-Q) John F. Tyrrell urged the rather general substitution of Ti-stabilized steel (Type 321) for the Cb-stabilized grade (Type 347). Reactions of 56 British and American metallurgists from the industries concerned. Besides comment on Mr. Tyrrell's main thesis, the discussion includes other closely related matters—for instance, the use of stabilized steel in the chemical industries. Information on corrosion resistance, service failures, weldability, melting, and pouring. (R10, T24, T29, SS, Cb, Ti)

452-R. Electron-Diffraction Study of the Nature of Oxidation of Metallic Alloys by Grinding at Different Rates Under Reduced Pressures; Case of an 80-20 Ni-Cr Alloy. (In French.) Robert Courtel. *Revue de Métallurgie*, v. 47, Sept. 1950, p. 700-702; discussion, p. 703.

The samples were ground in vacuum or in a controlled atmosphere. Experimental procedure and results. Diffraction patterns show changes in crystalline phase which take place upon grinding at different rates, temperatures, pressures, and atmospheres. (R2, N5, G18, Ni)

453-R. Law of Oxidation of Metallic Cerium. Generalization to Other Metals. (In French.) Jean Loriers. *Comptes Rendus* (France), v. 231, Sept. 4, 1950, p. 522-524.

Development of a mathematical law in which Ce_2O_3 is first formed and then further oxidized to CeO_2. Weight-increase curves for various temperatures are charted and discussed. Possibility of applying the law to other metals. It has already been applied to uranium and suggested for corrosion of iron by water vapor. (R2, Ce)

454-R. Concerning the Anticorrosive Action of Soluble Cutting Oils; Electrochemical Analysis of Their Protective Action in Water in Combination With Other Inhibitors. (In Italian.) Antonio Ferri. *Metallurgia Italiana*, v. 42, July 1950, p. 261-267.

Experimental results of use in contact with steel. $K_2Cr_2O_7$ was found to be superior to the other inhibitors studied. 18 ref. (R10, ST)

455-R. Alloys Resistant to Hydrochloric Acid. (In German.) B. Waeser. *Werkstoffe und Korrosion*, v. 1, Sept. 1950, p. 345-349.

Reviews work done on HCl-resistant cast irons and other alloys, and points out that for satisfactory results, more research is required. 36 ref. (R5, SG-g, CI)

456-R. New Corrosion-Resistant Materials in Foreign Countries. IV. Low-Iron Copper-Nickel Alloys for Condenser Tubes. (In German.) E. Franke. *Werkstoffe und Korrosion*, v. 1, Sept. 1950, p. 349-357.

Reviews the literature dealing with various types of corrosion and with different corrosion resistant alloys and their properties. 35 ref. (R general, Cu, Ni, SG-g)

457-R. The Effect of Deformation of the Surface Layers of Metal During Oxidation. (In Russian.) P. D. Damkov and P. V. Churaev. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 73, Aug. 21, 1950, p. 1221-1224.

The phenomenon of torsion of isolated protective oxide layers observed for the first time by Evans and assumed by him to be a direct result of stresses formed during oxidation of the surface layer of metal was investigated. Results obtained for Fe and Mg clearly indicate the presence of the above deformation and make it possible to evaluate its magnitude approximately. (R2, Fe, Mg)

458-R. Activity of Galvanic Cells and Electrochemical Corrosion of Metals by Dielectrics. (In Russian.) L. G. Gindin. *Doklady Akademii Nauk SSSR* (Reports of the Academy of Sciences of the USSR), new ser., v. 74, Sept. 11, 1950, p. 311-313.

Results of experimental investigation indicate that an ordinary galvanic Mg-Fe cell generates an electric current in a 1.5N iso-octane solution in CH_3COOH. Methods of investigation and results of measurement of emf. The phenomenon indicates that rate of corrosion of metals in dielectrics is determined not so much by their electroconductivity as by solubility of the corrosion products. (R1, P15)

S
INSPECTION AND CONTROL

417-S. Materials Data That Are Significant to the Designer. Charles Lipson. *Automotive Industries*, v. 103, Oct. 15, 1950, p. 38-41, 94, 96.

Trend toward testing of actual components under service conditions, since conventional tests on standard specimens of the material often give misleading or inadequate information. (S21)

418-S. Colorimetric Determination of Nickel in Brasses and Bronzes. W. L. Miller and George Norwitz. *American Foundryman*, v. 18, Oct. 1950, p. 67.

Rapid and accurate procedure. (S11, Cu)

419-S. Why Standardize Thicknesses of Thin Flat Metals. I. V. Williams. *Standardization*, v. 21, Oct. 1950, p. 260-261, 272.

ASA Standard B32.1: "Preferred

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Thicknesses for Thin Flat Metals Uncoated." Gives reasons in favor of universal adoption of the standard, as well as difficulties which have delayed its adoption. (S22)

420-S. Rapid Polarographic Determination of Zinc in Copper-Base Alloys. Milton Sherman. *Foundry*, v. 78, Nov. 1950, p. 94-95.
(S11, Zn, Cu)

421-S. The Camera—A Useful Foundry Tool. Benjamin Melnitsky. *Foundry*, v. 78, Nov. 1950, p. 108-113, 206, 208-210.
A wide variety of applications at Battelle Memorial Institute, National Bureau of Standards, Armour Research Foundation, and elsewhere. Includes highspeed photography of fluid flow, microfilming, metallography, electron microscopy, radiographic inspection, x-ray diffraction, and spectroscopic analysis.
(S13, S11, M21, M22, M23, E general)

422-S. Polarographic Determination of Aluminum; Use of an Organic Reagent. Hobart H. Willard and John A. Dean. *Analytical Chemistry*, v. 22, Oct. 1950, p. 1264-1267.
New method is based on reduction of an aluminum di-o-hydroxyazo complex. It is sensitive to 0.005 mg. of Al per 50 ml., and is generally applicable to steels, nonferrous alloys, and minerals with an accuracy of ±3% after removal of interferences at a mercury cathode or by fusion with Na_2CO_3. 10 ref. (S11, Al)

423-S. Spectrophotometric Study of the Ruthenium-Thiourea Complex. Gilbert H. Ayres and Frederick Young. *Analytical Chemistry*, v. 22, Oct. 1950, p. 1277-1280.
Interference tests were made with solutions of Fe, Co, Ni, Cu, and Cr; of these, only Co and Cr gave appreciable interference. By the usual methods employed for separation of Ru and Os from all other metals and from each other, cation interference can be eliminated. Anions that might be introduced during the various separation methods do not interfere in the concentrations studied. 27 ref. (S11, Ru, EG-c)

424-S. Spectrophotometric Study of the Ruthenium—Dithio-oxamide Complex. Gilbert H. Ayres and Frederick Young. *Analytical Chemistry*, v. 22, Oct. 1950, p. 1281-1283.
Interference tolerances for other platinum metals, common cations which are colored and anions that might be present in certain separation procedures. Os is the only platinum metal that interferes extensively at 650 μm. (S11, Ru, EG-c)

425-S. Converting Platinum Resistance to Temperature. D. N. Eggenberger. *Analytical Chemistry*, v. 22, Oct. 1950, p. 1335.
Graphical method and its derivation. (S16)

426-S. Precision Thermostat for High Temperatures. William R. Eubank. *Review of Scientific Instruments*, v. 21, Oct. 1950, p. 845-851.
Suitable for control of temperatures of 1000-1550° C. Temperatures are readily maintained constant within ±0.1° C. for several hours, and within ±1.0° C. for several days. 12 ref. (S16)

427-S. The Determination of Thorium in High Grade and Low Grade Ores (Trace Elements Investigations—Report No. 44). F. S. Grimaldi and Charlotte A. Marsh. *U. S. Atomic Energy Commission*, AECD-2818, Sept. 1947, 9 pages.
Determination in monazite ores, which is successful for ores down to 0.04% ThO_2. Th is separated from Ca, Mg, and most rare earths by double precipitation with ammonia; from Zr, Ti, and Cb by precipitation as fluoride; and from remaining rare earths by peroxynitrate precipitations. Conditions were found that successfully overcome interferences. (S11, Th)

428-S. The Determination of Thorium in Low-Grade Ores. Brenton H. Dickson and David Kaufman. *U. S. Atomic Energy Commission*, AECD-2887, Mar. 10, 1950, 21 pages.
Modifications of methods by Grimaldi, Rodden, and their respective co-workers for application to California black sands. 12 ref. (S11, Th)

429-S. Investigation of Quality of Concrete Reinforcing Steel. *U. S. Bureau of Reclamation, Research and Geology Division*, Materials Laboratories Report No. M-73, 1949, 15 pages.
ASTM specifications and building code recommendations. Strength and hardness tests. (S22, Q23, Q29, CN)

430-S. The Use of Platinum Thermocouples in Vacuo at High Temperatures. A. G. Metcalfe. *British Journal of Applied Physics*, v. 1, Oct. 1950, p. 256-258.
During thermal analysis on Co-base alloys in vacuum with Pt-Pt + 13% Rh thermocouples it was found that the e.m.f. developed at any temperature gradually falls. The principal cause of this is believed to be the transfer of Rh to the Pt wire via the vapor phase. It is shown that this effect can be reduced considerably by use of a platinum + 1% Rh wire in place of the Pt wire. (S16, SG-a, Pt)

431-S. Control of Microstructure of a Heat Resistant Alloy for Turbo Reactor Blades. (In French.) P. A. Jacquet. *Revue de Métallurgie*, v. 47, Aug. 1950, p. 568-572.
Method of defect detection applied to "Nimonic" alloy: 20% Cu; 72% Ni; balance Fe, Ti, and Al. This method consists in preliminary electropolishing. Details of solutions and procedure. (S13, M27, Ni, SG-h)

432-S. Automatic Devices Reduce Inspection Costs. Joseph Geschelin. *Automotive Industries*, v. 103, Nov. 1, 1950, p. 32-33, 64, 66.
Automatic electric, electronic, and air-actuated inspection devices are being applied wherever possible at Ford Motor Co. to reduce inspection cost and improve quality. Several examples recently developed, particularly for gaging. (S14)

433-S. Sodium Content in Aluminum Speedily Analyzed. D. A. Brewster and C. J. Clausen, Jr. *Iron Age*, v. 166, Nov. 2, 1950, p. 88-92.
Rapid and accurate photometric method. Light intensities of atomized solutions are measured with a Beckman spectrophotometer. Accuracies are higher than with conventional procedures. Analyses can be completed in 30 min. (S11, Al)

434-S. For Successful Production Welding Know Your Metals. Jay Bland. *Industry & Welding*, v. 23, Oct. 1950, p. 38-39, 41, 74-75; Nov. 1950, p. 24, 66.
First two articles of series on spark-test identification. (To be continued.) (S10, K general)

435-S. Thermal Cracks in Turbine and Generator Rotor Forgings. *Mechanical Engineering*, v. 72, Nov. 1950, p. 919-921.
Separate comments by J. T. Jarman, J. W. Price, Jr., A. O. Schaefer, J. C. Smack, and H. A. Wagner on above paper by A. W. Rankin, C. J. Boyle, C. D. Moriarty, and B. R. Seguin (July issue; see item 289-S, 1950). Includes authors' replies.
(S13, T25)

436-S. Temperature and Intensifying Screen Effects in Radiography With Cobalt-60. A. Morrison and K. J. Parry. *Non-Destructive Testing*, v. 9, Summer 1950, p. 9-10.
Effect of temperature on film density, optimum front lead-screen thickness, and sensitivities obtainable with lead-foil screens and with commercial fluorescent screens. (S13)

437-S. Xeroradiography—A Basic Developument in X-Kay Nondestructive Testing. Robert C. McMaster and Roland M. Schaffert. *Non-Destructive Testing*, v. 9, Summer 1950, p. 11, 22.
New rapid, low-cost, all-electric method of obtaining permanent X-ray images does away with film and chemical processing. Contrast sensitivity is better than the 2% required for inspection of aircraft parts. The process possesses an unusual local contrast sensitivity which reveals small discontinuities clearly. Definition exceeds 200 lines to the inch. Speed exceeds that of most nonscreen X-ray films. (S13)

438-S. Mottling of Fine Grained X-Ray Films. H. E. Stauss, F. W. Vonbatchelder, and W. C. Sadler. *Non-Destructive Testing*, v. 9, Summer 1950, p. 12-14.
Mottling was observed when Type M film was substituted for Type K. Tin was found on the surfaces of the lead sheets at fault, and probably was responsible for the mottling. Although no corrosion products could be detected by X-ray analysis, investigation was made of the influence of thin films of corrosion products because of the possibility that some might be fluorescent. Lead sulfate was found to be fluorescent. However, it was concluded that thin films of corrosion products, either fluorescent or nonfluorescent reduce intensification by absorption of photoelectrons.
(S13, R2)

439-S. Noncontacting Thickness Gauge Using Beta Rays. C. W. Clapp and S. Bernstein. *Transactions of the American Institute of Electrical Engineers*, v. 69, 1950, p. 488-490.
Previously abstracted from *General Electric Review*. See item 138-S, 1950. (S14, Al)

440-S. Flight and Ground Loads on Light Plane Wing Fittings. Given A. Brewer. *Proceedings of the Society for Experimental Stress Analysis*, v. 8, no. 1, 1950, p. 93-102.
Analysis of the failure in flight of the rear wing fitting on a popular, small, light plane. Results of flight tests are plotted. (S21, T24)

441-S. Dye-Penetrant Inspection. James Joseph. *Welding Engineer*, v. 35, Nov. 1950, p. 38-39.
(S13)

442-S. An Interferometric Method for Accurate Thickness Measurements of Thin Evaporated Films. L. G. Schulz. *Journal of the Optical Society of America*, v. 40, Oct. 1950, p. 690-692.
Method is evaluated by comparison with other methods and in terms of its applications and limitations. (S15)

443-S. Ultrasonic Rail Testing on the New York Central. C. B. Bronson. *Railway Engineering and Maintenance*, v. 46, Nov. 1950, p. 1025-1027.
Equipment and procedures.
(S13, T23)

444-S. Why Machine Parts Fail. Part 7. Failures Originating on the Drawing Board. Charles Lipson. *Machine Design*, v. 22, Nov. 1950, p. 158-162.
Failures caused by improper design. Poor design of keyways, splines, fillets, oil holes, threads, gear teeth, poor press and shrink fits, overstress, and combined effects. Graphs and tables show stress concentration factors. (S21, Q25)

445-S. Determination of Impurities in Electroplating Solutions. XX. Traces of Chromium in Zinc Plating Baths. Earl J. Serfass and Mary H. Perry. *Plating*, v. 37, Oct. 1950, p. 1057-1059.
Development of a rapid, accurate method for determination of a very small amount of chromate ion in Zn plating baths which also may

contain Cu, Co, Ni, Fe^{+++}, and Pb as impurities. The method involves measurement of transmittancy of a solution and determination of amount of Cr from a curve. 12 ref. (S11, L17, Zn, Cr)

446-S. The Determination of Trivalent Chromium in Chromic Acid Plating Baths. Fielding Ogburn. *Plating*, v. 37, Nov. 1950, p. 1153-1155.

Existing methods are said to be inaccurate, slow and tedious, or require potentiometric equipment. The new method does not suffer from these drawbacks. It involves precipitation by NaF, solution in H_2SO_4, and two titrations. (S11, L17, Cr)

447-S. Progress in Ultrasonic Methods of Materials Testing. O. Rudiger. *Engineers' Digest*, v. 11, Oct. 1950, p. 352-354. Translated and condensed.

Previously abstracted from *Stahl und Eisen*. See item 399-S, 1950. (S13)

448-S. The Breaking of Valve Springs. P. Kohn. *Engineers' Digest*, v. 11, Oct. 1950, p. 358-361. Translated and condensed from *Strojnicky Obzor*, v. 30, May 1950, p. 65-70.

Causes and means for prevention of breakage. The influence of fluctuations in rotation of the camshaft on the oscillation of valve springs, which in many cases is likely to be the cause of apparently inexplicable spring breakages. Alloys used are not discussed. (S21, T7)

449-S. The Choice of Metals. N. B. Brown. *Canadian Metals*, v. 13, Oct. 1950, p. 10-12, 44, 46.

Properties of ferrous metals in terms of their suitability for specific industrial uses. Importance of considering factors of cost and manufacturing methods as well as metal specifications themselves. (S22, T general, ST)

450-S. Reports on Miscellaneous Metallurgical Investigations. H. H. Symonds. *Journal of the Birmingham Metallurgical Society*, v. 30, Sept. 1950, p. 92-116.

Failure of brass nuts from the filling heads of an aerated water machine. Investigation into the premature failure of welt needles. Cracking of lipstick holder caps. Surface imperfections on brass trays. (S21, Cu, CN)

451-S. The Accurate Determination of Carbon in Low-Carbon Steels. J. E. Wells. *Journal of the Iron and Steel Institute*, v. 166, Oct. 1950, p. 113-117.

The method is based on the use of a liquid-oxygen trap for isolation of CO_2 produced by burning the steel in O_2. The quantity of CO_2 formed is subsequently estimated by measuring the pressure exerted when it is confined to a known volume. The apparatus gives reproducible results of at least the same order of accuracy as those obtained by other low-pressure methods, and has the merit of simplicity. (S11, ST)

452-S. Rapid Estimation of Phosphorus in Steels. A. Hans. *Journal of the Iron and Steel Institute*, v. 166, Oct. 1950, p. 118-122.

The methods of Hanau and Wolfe and of Hasler and Barley for spectrographic analysis of steel; results of a number of comparative experiments. The Geiger-Muller counter and the electron-multiplier tube and their respective values for use in estimation of phosphorus. (S11, ST)

453-S. Continuous Temperature Measurement of Liquid Steel in the Furnace. D. Hardwick and H. Everard. *Journal of the Iron and Steel Institute*, v. 166, Oct. 1950, p. 147-148.

Continuous records of temperature of steel in a side-blown converter were obtained throughout the blowing operation by fitting a Pt/Pt-Rh thermocouple with a specially designed protective sheath into the refractory wall during lining of the vessel. Results indicate that this arrangement could be of general use for steel melting research and possibly for production control. (S16, D3, ST)

454-S. Measuring of Small and Smallest Holes; Two New Measuring Methods. (Concluded.) Rudolf Lehmann. *Microtecnic*, v. 4, May-June 1950, p. 120-129. (Translated from the original text in German.)

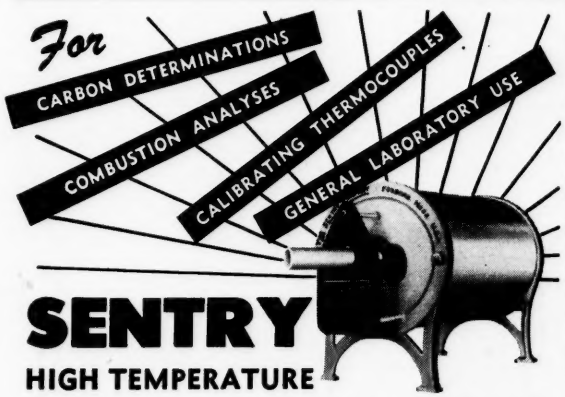
A critical survey of internal gaging instruments reveals that they possess certain disadvantages when small or very small holes are measured. Two new measuring instruments, based on a mechanical-optical principle, are now being built by a German firm. The measuring range of one is between 0.5 and 50 mm. and of the other between 0.05 and 8 mm. Error is $\pm 1\mu$. (S14)

455-S. Applications of the Electronic Tubes to the Measurements of Temperature. Jean Schwartz. *Microtecnic*, v. 4, May-June 1950, p. 159-164; July-Aug. 1950, p. 209-216. (Translated from the French.)

A comprehensive review. Part 1: Introduction, purposes in general, and use of thermosensitive elements and resistance thermometers. Part 2: Thermocouples, optical pyrometers, photo-electric pyrometers, and indicating and recording instruments. (To be continued.) (S16)

456-S. Methods of Measurement and Definition of Surfaces. H. Becker. *Microtecnic* (English Ed.), v. 4, July-Aug. 1950, p. 180-184. (Translated from the German.)

Various optical instruments. Schematic diagrams show principles of action. (To be continued.) (S15)



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457-S. Surface Testing and Its Standardization. (In German.) H. Becker. *Metall,* v. 4, Sept. 1950, p. 359-365.

The "feeler" method of determining and recording surface roughness. German and foreign instruments and problems of standardizing surface conditions. (S15)

458-S. Dye Penetrant Quickly Reveals Surface Flaws. Alexander Gilbert. *Iron Age,* v. 166, Nov. 16, 1950, p. 91-92.

New inspection technique. (S13)

459-S. Permanent Record of Magnaflux Indications. Harold H. Lurie. *Metal Progress,* v. 58, Nov. 1950, p. 736.

Quick way of preparing the sample so a Scotch-tape print can be made in a few minutes, by using a 1½% (by volume) suspension of the black paste in CCl_4. (S13)

460-S. Thermocouple Junctions Are Improved by Arc Welding in Inert Atmosphere. A. J. Francescan and E. A. Nitz. *Petroleum Processing,* v. 5, Nov. 1950, p. 1205-1206.

Improved technique. (S16, K1)

461-S. Beam Profiles With Parallel Flanges. (In French.) J. Courthéoux. *Revue de Métallurgie,* v. 47, Sept. 1950, p. 669-677.

New standard profiles for "H" ("I"), "T", and "U" beams. Methods of production and fields of application. European and American standards are comparatively tabulated. (S22, F23, CN)

462-S. Control of Surface Condition by a Fluorescence Inspection Technique. (In French.) Maurice Deribere. *Revue de Métallurgie,* v. 47, Sept. 1950, p. 704-705; discussion, p. 705.

A short review, indicating a series of fluorescent agents and their composition. (S15)

463-S. Two Nomograms for Use When Measuring With Optical Pyrometer. (In German.) J. Euler and R. Ludwig. *Zeitschrift für angewandte Physik,* v. 2, Sept. 15, 1950, p. 362-366.

Nomograms presented permit conversion of black-body temperature into true temperature provided absorptivity is known. Color temperature may be stated from two black-body temperature readings at different wave lengths. Mathematical principles. 14 ref. (S16)

464-S. (Book) **Principles and Practice of Spectrochemical Analysis.** Norman H. Nachtrieb. 324 pages. 1950. McGraw-Hill Book Co., 330 W. 42nd St., New York 18, N. Y.

Describes theory and use of the instruments of emission spectroscopy and theory of analytical spectroscopy. Application of spectrographic methods to solutions, metals, and nonconducting solids. The roles of electrolysis, solvent extraction, organic complexing reagents, carrier precipitations, and manipulative operations of trace analysis. (S11)

465-S. (Book) **Industrial Instrumentation.** Donald P. Eckman. 396 pages. 1950. John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y.

Reviews the principles of measuring methods employed in industrial processing. Emphasizes the method rather than the mechanism. Mechanical, chemical, and electrical applications. Includes temperature-measurement methods and apparatus, methods for composition analysis, also problems with each chapter. Footnote references. (S general)

466-S. (Book) **Atlas der Restlinien. Bd. I. Spektren von 30 chemischen Elementen. Ed. 2. Bd. II. Spektren der seltenen Erden. Ed. 1. Bd. III. Spektren seltener Metalle und einiger Metalloide. Ed. 1.** (Atlas of Persistent Spectral Lines. Vol. I. Spectra of 30 Chemical Elements. Vol. II. Spectra of the Rare Earths. Vol. III. Spectra of the Rare Earths and Some Semimetallic Elements.) Alois Gatterer and Joseph Junkes. 53, 350, and 80 pages. 1947, 1945, and 1949. Specola Vaticana, Vatican City, Italy. $15.00, $45.00, and $25.00.

Vol. I contains charts and tables of prismatic arc and spark spectra of Ag, Al, As, Au, B, Ba, Bi, C, Ca, Cd, Co, Cr, Cu, Mg, Mn, Mo, Ni, P, Pb, Pt, Rb, Sb, Si, Sn, Sr, Ti, Tl, V, W, and Zn. Vol. II covers 18 rare-earth elements. Vol. III covers Au, As, Be, Ga, Ge, Hf, In, Ir, Nb, Os, Pd, Pt, Re, Rh, Ru, Sb, Ta, Te, and U (arc and spark spectra from 2100 to 6340 A); and high-frequency excitation spectra (2340-6430 A) of Cl, Br, I, S, Se, and Hg. The spectral charts are photographic negatives. Each spectrum is shown in triplicate with weak, medium and strong exposures, each accompanied by an iron-arc spectrum, by an engraved scale of wavelengths, and by engraved wavelengths of the principal lines. (S11)

T

APPLICATIONS OF METALS IN EQUIPMENT

454-T. First Clutch Housing of Die Cast Aluminum. Joseph W. Steel. *Automotive Industries,* v. 103, Oct. 15, 1950, p. 32-33, 98.

Used on Nash automobiles. Mechanical-test setups and test results. (T21, Q general, Al)

455-T. Cooling Rates in Modern Furnaces. M. H. Mawhinney. *Industrial Heating,* v. 17, Oct. 1950, p. 1708-1710, 1712, 1714, 1870-1872, 1874, 1876, 1878.

Methods by means of which the cooling of furnaces under different conditions may be estimated in a simple manner. Tables and graphs cover batch-type furnaces and continuous furnaces. (T5)

456-T. Steel Welding Wire. G. E. Claussen and H. E. Sincock. *Wire and Wire Products,* v. 25, Oct. 1950, p. 841-843, 846-847, 908-909, 911.

Steel welding wire is produced by steel mills for further processing into finished welding rods and electrodes. Compositions of principal commercial types, and a number of experimental types. Compositions of three experimental coatings. Test results on properties and compositions of welds made with the different electrode and coating compositions. (T5, K1, K2, ST)

457-T. Materials at Work. *Materials & Methods,* v. 32, Oct. 1950, p. 70-71.

Includes: Al crossarms for power-transmission lines; cast steel "benthoscope"—deep-sea diving bell; steel-hubbed Al gears. (T general, Al, CI)

458-T. "The Dome of Discovery"—Largest Aluminum Structure Yet. *Modern Metals,* v. 6, Oct. 1950, p. 21.

A 365-ft. diam. structure being constructed in Britain. (T26, Al)

459-T. Light, Strong Electrical Connectors of Aluminum. *Modern Metals,* v. 6, Oct. 1950, p. 26-27.

Special fittings for military equipment made by American Phenolic Corp. Housings are Al die castings and parts are machined from Al rod. (T1, Al)

460-T. Aluminum's Next Big Target — The Container Industry. *Modern Metals,* v. 6, Oct. 1950, p. 36-39.

Present applications to drums, collapsible tubes, food cans, etc. Advantages which should lead to much more extensive utilization. (T10, Al)

461-T. Tank Cars. R. W. Lahey. *Chemical Engineering,* v. 57, Oct. 1950, p. 203-204, 206.

Use of steel (carbon or stainless), aluminum, nickel, or resin linings in construction of tank cars. Types recommended for typical commercial chemicals. (T29, Al, ST, Ni)

462-T. Construction Materials in the Paper Industry. Part II. Bleaching. *Chemical Engineering,* v. 57, Oct. 1950, p. 217-218, 220-223.

Part II of a symposium in which materials of construction are evaluated for various services in the paper industry. Consists of the following: "High-Silicon Irons", Walter A. Luce; "Cements", Raymond B. Seymour; "Nickel, Nickel Alloys", H. O. Teeple; "Rubber", James P. McNamee, and "Coatings", Kenneth Tator. (T29)

463-T. Aluminum Extending Residential Sheet Metal Work. *Sheet Metal Worker,* v. 42, Oct. 1950, p. 46-47.

New exterior and interior applications. (T26, Al)

464-T. The Manufacture of Large Press Dies. *Machinery Lloyd* (Overseas Edition), v. 22, Sept. 30, 1950, p. 97-99, 101.

How costs can be drastically reduced by building up such dies from "composite forgings", which comprise a toolsteel cutting edge flash-butt-welded to a mild steel base. (T5, K3, TS, CN)

465-T. Aluminium Footbridge at Pitlochry. *Engineer,* v. 190, Oct. 13, 1950, p. 368-370.

Includes preliminary experimental work on riveting procedures. (T26, K13, Al)

466-T. How To Make Armament. *American Machinist,* v. 94, Oct. 30, 1950, p. 99-107.

Bibliography of *American Machinist* articles since 1938 concerned specifically or basically with armament production. The articles are indexed in a list subdivided into major categories such as "assembly" or "processes," and in turn subdivided into groups such as "welding" or "presswork." Each listing bears one or more of four initials, "A" for aircraft, "V" for vehicles, "S" for ships, and "O" for ordnance or weapons. (T2, G general)

467-T. Aluminum Nails Gain Favor Among Users. R. L. Hatschek. *Iron Age,* v. 166, Nov. 2, 1950, p. 106.

Increased consumption and superior properties. (T7, Al)

468-T. Welded Steel Drier Rolls Increased Paper Production and Reduced Maintenance. Harry Fieberts. *Paper Trade Journal,* v. 131, Nov. 2, 1950, p. 21-23.

Welded rolls used in the paper industry, and their advantages. (T29, ST)

469-T. Problems of Change-Over From Steel to Aluminum in Fabricating Truck Bodies. *Light Metal Age,* v. 8, Oct. 1950, p. 8-9.

How demand for lighter truck bodies to allow increased payloads forced a steel fabricator to adjust to new techniques for handling aluminum. (T21, Al)

470-T. Milium. *Light Metal Age,* v. 8, Oct. 1950, p. 11.

New resinated-aluminum sprayed fabric that reflects the heat radiated from the body to make clothing warmer. (T10, Al)

471-T. What's New in Mold Making. J. L. Morrison. *India Rubber World,* v. 123, Nov. 1950, p. 191-192.

New developments in the plastics mold-making industry cover both mold-making machinery and mold steels. (T29, AY)

472-T. Electrode Deterioration in Transmit-Receive Tubes. Judson C. French. *Journal of Research of the*

National Bureau of Standards, v. 45, Oct. 1950, p. 310-315.

Investigation of the failure of a modified 1B24 TR tube revealed the cause to be short circuiting of the pulsed keep-alive cathode to its anode, due to formation of an unusual deposit on the cathode insulation and on the nearby anode surfaces. The glow discharge normally present breaks into a momentary arc, which by local heating of the cathode frees the metal that forms the deposit. Use of 18-8 stainless-steel cathodes provided great improvement over the Kovar previously used. Ni anodes were used in all cases. (T1, R1, SS)

473-T. Are Stainless Conveyor Belts Commercially Feasible? *Steel,* v. 127, Nov. 13, 1950, p. 100-101.

Development work to date. (T5, SS)

474-T. Magnesium in the NACA's Pilotless Aircraft. Caldwell C. Johnson, Jr. *Magazine of Magnesium,* Nov. 1950, p. 2-5.

Supersonic-research model used for basic aerodynamic research at high speeds. Properties and methods of fabrication. (T24, Mg)

475-T. Modern Nickel Plating: the Solution to Varied Problems. *Inco Magazine,* v. 24, Autumn 1950, p. 4-7.

An illustrated survey. (T general, L17, Ni)

476-T. New Pump for Many Services. *Inco Magazine,* v. 24, Autumn 1950, p. 14-15.

Pump made in five sizes and designed to handle heavy or light, viscous or non-viscous liquids. Castings of five different Cu-Ni alloys containing 20-30% Ni are used, also a Type 316 stainless steel spring. (T7, Cu, SS)

477-T. New Metal Outboard for Salt Water. *Inco Magazine,* v. 24, Autumn 1950, p. 16-17.

Hull is entirely made of monel metal. (T22, Ni)

478-T. USAF Testing Titanium as Structural Material for Planes. *CADO Technical Data Digest,* v. 15, Nov. 1950, p. 6-7. (T24, Ti)

479-T. Reinforced Lumber. *Industrial and Engineering Chemistry,* v. 42, Nov. 1950, p. 10A, 14A, 18A.

Unusual processes in which wood is impregnated with molten metal. Use as self-lubricated wooden bearings is suggested. Physical properties. (T7)

480-T. Stainless Jackets for Cold Water Exterior Risers. *Sheet Metal Worker,* v. 42, Nov. 1950, p. 44, 46.

A practical way of providing air conditioning for an older type building was solved by running chilled-water risers up the south side. They are protected by stainless-steel columns that add a modern note to the building. (T27, SS)

481-T. Aluminium in Houses. H. A. Moore. *Transactions of the Indian Institute of Metals,* v. 1, Apr. 1949, p. 233-245; discussion, p. 245-248.

An illustrated survey. (T26, Al)

482-T. Hardened Steel Rolls. Their Manufacture and Use. C. W. Hirst and W. Shaw. *Transactions of the Indian Institute of Metals,* v. 3, 1949, p. 229-251.

Early history of rolling mills and rolls. The properties required in rolls for the manufacture of nonferrous sheets and strip. Steel compositions used, care and precautions required during forging, machining, hardening, grinding, etc. The types of failures encountered in rolls and their causes. Heat treatment. A typical analysis contains 1.95% Cr. (T5, F23, AY)

483-T. Gadgets: Small Attention-Getters. *Die Castings,* v. 8, Nov. 1950, p. 21, 42.

New device for securing the attention of the reader to direct-mail advertising. Example shown is a small die-cast horseshoe for enclosure in letters. (T10, E13)

484-T. Where Corrosion Is Most Severe. *Die Castings,* v. 8, Nov. 1950, p. 22-23, 41-42.

Designed to operate under conditions of extreme heat and cold, and exposed to grease, oil, animal fats, blood, and salt brine—truck wheels for the meat-packing industry have Zn die-cast hubs and hub caps. (T21, R7, E13, Zn)

485-T. From Wood Fabrication to Die Cast Aluminum. *Die Castings,* v. 8, Nov. 1950, p. 36-39.

Redesign of Christian Becker analytical balance. (T8, E13, Al)

486-T. Test Silicon Bronze Bolts for Electrical Connectors. Julian Rogoff. *Electric Light and Power,* v. 28, Nov. 1950, p. 106, 155.

Size, material, finish, and surface conditions have a definite bearing on the effectiveness of bolts used in electrical connectors. Graphs give relationship between contact resistance and contact pressure for three surface finishes (mechanical); torque vs. axial thrust for bolt-nut assemblies of the same size but four different alloy combinations; and torque vs. axial thrust for dry and lubricated assemblies. (T7, T1, K13, Cu)

487-T. Magnesium Faces the Fifties. *Modern Metals,* v. 6, Nov. 1950, p. 17, 19, 21. Excerpts from talk by Edward S. Christiansen.

Future prospects for increasing use of magnesium. (T general, Mg)

488-T. Extruded Magnesium Trailer Flooring. A. E. Williams. *Modern Metals,* v. 6, Nov. 1950, p. 22-23.

Why and how Fruehauf has adopted magnesium for trailer floors. (T21, Mg)

489-T. Magnesium in Aircraft Structures. J. P. Donald Garges. *Modern Metals,* v. 6. Nov. 1950, p. 25-26.

Use of Mg promises many design and production economies for aircraft companies, and is ideally suited for today's high-speed jets and mammoth bombers. (T24, Mg)

490-T. Use of Magnesium Doubles Dry Cell Battery Capacity. Paul Filter. *Modern Metals,* v. 6, Nov. 1950, p. 35-36.

Development of the Mg dry cell by Dow Chemical Co. working in conjunction with the Signal Corps. (T1, Mg)

491-T. The Importance of Chemical Products to Automobiles. C. L. McCuen. *Automotive Industries,* v. 103, Nov. 15, 1950, p. 46-47, 100.

Lists 250 chemical products used directly or indirectly in the automobile industry. (Metals and alloys are included.) Weights of 28 materials or groups of materials used in an average four-door sedan. (Amounts range from 2556.29 lb. of steel to 0.0016 lb. of vanadium.) Chemical problems awaiting solution (including fuels, lubricants, batteries, etc.) (T21)

492-T. Town Gas in a Dental Workshop. William Kirk. *Gas Journal,* v. 264, Nov. 1, 1950, p. 61-65, 68-69.

Equipment and procedures for casting metal plates and for making plastic dentures. (T10)

493-T. Metallic Structures Consisting of Bent Sheets Joined by Welding. (In French.) J. Prouvé. *Soudure et Techniques Connexes,* v. 4, July-Aug. 1950, p. 141-146; discussion, p. 147-148.

Technique using steel or Al sheets. Recommends this type of construction for "prefabricated houses". Advantages for specific applications. (T26, K general, ST, Al)

494-T. (Book) La Technique du Chauffage Electrique. Tome I. Theories et Calculs. (Technology of Electrical Heating. Vol. I. Theories and Calculations). C. Frérot. 503 pages. 1950. Gauthier-Villars, Paris, France. 2300 frs.

Covers both industrial and domestic applications. Part I is a general summary of the fundamentals of electric heating. Part II deals with transformation of electric energy to heat energy. Part III covers resistance of metals to electric current, characteristics of alloys for resistance wiring, and types of heating elements. Part IV covers electric boilers, decomposition of water by electric current, and resistivity characteristics of water. Part V discusses heat transmission, steam accumulators, and the storing of heat energy. (T5, P15)

495-T. (Book) Fortschritte im Stahlbeton. (Progress in Concrete-Reinforcing Steel). R. Saliger. 138 pages. 1950. Franz Deuticke, Vienna, Austria. $3.20.

Technology and mechanical properties of steel reinforcing bars for concrete. Topics include tensile strength, ductility, slipping resistance, crack formation, and the importance of certain qualities to the strength of beams, columns, and structures as a whole. Types of bars and research results are mainly European. Includes bibliography. (T26, Q23, CN)

V

MATERIALS
General Coverage of Specific Materials

204-V. Latest Advances in Cast Iron Field. Richard Schneidewind and R. G. McElwee. *Automotive Industries,* v. 103, Oct. 15, 1950, p. 42-43, 90, 92.

New developments in foundry practice and compositions. Properties and applications. (E general, CI)

205-V. How To Work Tool and Die Steels. Part I. Anderson Ashburn. *American Machinist,* v. 94, Oct. 16, 1950, p. 145-160.

Special report. Classification and properties; selection; forging; heat treatment; testing; and machining. (TS)

206-V. Zirconium Offers Interesting Properties and Possibilities. *Materials & Methods,* v. 32, Oct. 1950, p. 63-64.

Properties, present and potential applications. (Zr)

207-V. Iron-Base Heat Treatable Alloy Has Good High Temperature Strength. E. F. Losco. *Materials & Methods,* v. 32, Oct. 1950, p. 65-69.

Originally designed for gas turbine disks, Discaloy has found use for many other high and room-temperature applications. Nominal composition is 54.0% Fe, 26.0% Ni, 13.5% Cr, 3.2% Mo, 1.6% Ti, 0.7% Mn, 0.8% Si, 0.1% Al, and 0.03% C. Miscellaneous properties, heat treatment, weldability, workability, machinability, applications, etc. (SS, SG-h)

208-V. Heat Resistant Castings—Their Selection and Application. H. R. Clauser. *Materials & Methods,* v. 32, Oct. 1950, p. 79-90.

Manual gives comprehensive picture of standard types and grades of heat resistant alloys. General composition, high-temperature strength properties, corrosion resistance, special service properties,

and processing characteristics of the alloys. General types of applications for which each grade alloy is best suited. (SS, SG-h)

209-V. Cast Zinc Alloys. Typical Properties. *Materials & Methods,* v. 32, Oct. 1950, p. 91.

A data sheet. (Zn)

210-V. Wrought Zinc Alloys; Typical Properties. *Materials & Methods,* v. 32, Oct. 1950, p. 93.

A data sheet. (Zn)

211-V. How To Select the "Right" Cast Heat Resistant Alloy. N. A. Matthews. *Steel,* v. 127, Nov. 6, 1950, p. 90-92, 94, 104, 106.

Includes physical and mechanical data. (SG-h)

212-V. Elektron Magnesium-Zirconium Alloy Progress. C. J. P. Ball. *Magazine of Magnesium,* Nov. 1950, p. 8-11.

Tensile compressive proof stress, and fatigue properties and applications of the British "Elektron" alloys. (T general, Q27, Q7, Mg)

213-V. Spheroidal-Graphite Cast Iron. *Nickel Bulletin,* v. 23, July 1950, p. 118-121.

A wide variety of castings of the above type made in 5 different countries. (T general, CI)

214-V. Making Aluminium-Bronze Alloys. Marcel Cirou. *Foundry Trade Journal,* v. 89, Oct. 26, 1950, p. 349-350. Translated from *Fonderie.*

Previously abstracted from original. See item 188-V, 1950. (Cu)

215-V. The Properties of Aluminium and Its Alloys, and Some of Their Applications. J. C. Bailey and D. C. G. Lees. *Transactions of the Indian Institute of Metals,* v. 1, Apr. 1949, p. 135-159; discussion, p. 160-161.

An illustrated survey. (T general, Al)

216-V. Use of Aluminium Alloys in Structures. K. F. Antia. *Transactions of the Indian Institute of Metals,* v. 1, Apr. 1949, p. 181-203; discussion, p. 203-204.

Economic considerations; pertinent mechanical, physical, and corrosion properties; methods of fabrication; specifications, etc. (T26, Al)

217-V. Developments in the Application of Aluminium Alloys to Structures. D. V. Pike. *Transactions of the Indian Institute of Metals,* v. 1, Apr. 1949, p. 205-232.

Includes properties, fabrication, design and erection. (T26, Al)

218-V. Development of Chromium-Manganese Stainless Steels Using High-Purity Electrolytic Manganese for Alloying. D. N. Dhanbhoora and J. S. Vatchagandhy. *Transactions of the Indian Institute of Metals,* v. 3, 1949, p. 309-331.

Effect of replacing, wholly or in part, the Ni in 18-8 Cr-Ni austenitic stainless steel by high-purity Mn. A series of alloys with varying C, Ni, and Mn contents were prepared and forged into bars. A study was made of the microstructures of these alloys and the results correlated with knowledge gained from a study of phase diagrams of the ternary Fe-Cr-Mn system. Corrosion resistance of the alloys to atmospheric conditions, salt spray, HNO_3, H_2SO_4, intergranular attack, and high-temperature oxidation compared with that of a standard 18-8 stainless steel. Physical properties of the alloys. Concludes that low-carbon 18% Cr steels containing 4-12% Mn and 0-4% Ni have considerable promise. 11 ref. (Q general, R general, M27, SS)

219-V. The Evolution of Cast Iron in 25 Years. (In French.) Marsel Ballay and Raymond Chavy. "International Gieterij Congres 1949—Amsterdam", p. 55-64.

(E general, CI)

220-V. Magnesium (Elektron) Casting Alloys. (In English.) L. J. G. Van Ewijk. "International Gieterij Congres 1949—Amsterdam", p. 79-87, 88; discussion, p. 87.

Corrosion resistance, fire risk, mechanical properties, and foundry technique. 10 ref. (R general, Q general, E general, Mg)

221-V. The Present Status of Cast Iron. (In German.) Adalbert Wittmoser. *Stahl und Eisen,* v. 70, Sept. 14, 1950, p. 813-827; discussion, p. 828.

Reviews literature on the different types of cast iron. Compositions, structures, properties, heat treatments, and uses. 108 ref. (CI)

222-V. The Problem of Reducing the Nickel and Copper Contents of Al-Cu-Ni Aluminum Alloys. (In German.) Lisl Koch. *Metall,* v. 4, Oct. 1950, p. 427-428.

Studies were made on an alloy containing 4% Cu, 2% Ni, 1.5% Mg, remainder Al, to determine to what extent Cu and Ni can be replaced by other metals without impairing mechanical properties of the alloys. Results show that addition of 1.4% Fe permits reduction of Ni from 2 to 1.3%; that Si cannot replace Cu; but that an increased Mg content permits reduction of Cu by 1.5%. Data are tabulated. (Al)

223-V. The Plastic Mold Steels—Their Selection and Treatment. Lester F. Spencer. *Tool Engineer,* v. 25, Nov. 1950, p. 20-23.

Compositions, heat treatments, Cr plating, and applicabilities. (TS)

224-V. Cast Irons Containing Spheroidal Graphite. (In French.) J. B. Guillaumin. *Métaux et Industries,* v. 1, no. 1, 1950, p. 11-13.

Differences in structure and mechanical properties between spheroidal and ordinary cast iron. Method of production and applications. (CI)

225-V. Characteristics, Properties, and Applications of the Alloy Duralite (Termafond C3-INA). (In Italian.) *Alluminio,* v. 19, no. 4, 1950, p. 357-368.

The alloy has a nominal composition of 3.0% Cu, 1.5% Fe, 0.6% Mg, 0.6% Ni, 0.7% Si, 0.15% Ti, and remainder Al. Physical and mechanical properties, microstructure, thermal treatments, fabrication, and applications, under different conditions of preparation. 13 ref. (Al)

226-V. Conference on Stainless Steels. (In Russian.) *Vestnik Akademii Nauk SSSR* (News of the Academy of Sciences of the USSR), Aug. 1950, p. 66-71.

Briefly reviews 16 reports. Among the topics are nature of corrosion resistance, intercrystalline corrosion, stress corrosion, corrosion by dilute H_2SO_4, manufacture of stainless steel, chromizing of iron and steel, diffusion coating with stainless steel, deep drawing of stainless steel, and electropolishing and etching of stainless steel. (R general, L general, SS)

227-V. (Book) Steel Castings Handbook. Rev. ed. 522 pages. 1950. Steel Founders' Society of America, 920 Midland Bldg., Cleveland 15, Ohio. $4.00.

A complete revision of the original volume. Information on types of steel castings, specifications, design considerations, applications, mechanical and physical properties of cast steel, and other technical data covering virtually every facet of the industry, its products, processes, history, and outlook. Recommendations for purchasers of steel castings. Thoroughly indexed. (CI)

228-V. (Book) The Machining and Manipulation of Stainless Steels. W. F. Walker. 78 pages. 1950. Emmott & Co., Ltd., 31 King St. West, Manchester 3, England. 3s, 6d. (*Mechanical World* Monograph No. 57.)

Includes information on miscellaneous fabrication processes such as welding, working, and heat treatment, as well as machining. (G17, SS)

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METALLURGICAL ENGINEER: Welding graduate. B.S. in electrical engineering, 1940. Experienced in arc and gas welding, automatic-arc, submerged-arc and intert-gas, spot and seam welding, sales engineering, high alloy and stainless steel fabrication. Registered professional engineer. Can operate X-ray, metallographic microscope, spectroscope, heat treat furnaces, testing machines. Can do designing and manage production and personnel. Box 12-35.

METALLURGICAL ENGINEER: B.S. in metallurgical engineering. Age 31, veteran, family. Five years experience in nonferrous metals and alloys including melting, rolling, fabrication, metallography, physical testing, powder metallurgy, and some development in heat resistant metals. Desires challenging position with future. Midwest preferred. Presently employed in Chicago. Box 12-40.

METALLURGIST: Registered metallurgical engineer. Graduate chemist, graduate work in metallurgy. Receiving law degree (LLB) January 1951. Ten years experience in two steel mills and one research organization. Now in government contract administration. Desires position with a future. Married, age 32, veteran, no reserve status. Available Feb. 1, 1951. Box 12-45.

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METALLURGICAL ENGINEER: Bachelor's degree, Ohio State University, June 1949. Age 25, single, veteran. Currently employed. One year experience in open hearth and blooming mill as metallurgical inspector. Supervisor, extraction and refining nonferrous metals, 1½ years. Interested in production control leading to supervisory position in ferrous field. Prefers midwest. Box 12-55.

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METALLURGIST: Age 34, married. Ten years diversified metallurgical laboratory and production experience including institutional research on vacuum casting and diffusion, failure analysis, metallography, stress analysis, steel melting and report writing. Also some consulting and supervisory experience. B.S. in chemical engineering. Desires position in East in production or research. Box 12-70.

ADMINISTRATIVE ASSISTANT: To act as coordinator between laboratory and production departments. Age 29, veteran. B.S. degree in chemistry. Candidate for M.B.A. in production management, January 1951. Four years experience as metallurgist and chemist in metal fabrication, textile, and chemical industries. Will locate anywhere. Box 12-75.

TESTING ENGINEER: Fourteen years experience in testing and application of materials, also investigation of failures and organizing and conducting research. Experience in writing specifications and reports. Desires responsible technical position, preferably in research. Age 43, married. Educated Roanoke College and University of Chicago. Currently employed. Box 12-80.

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Graduate

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Cut maintenance costs . . .

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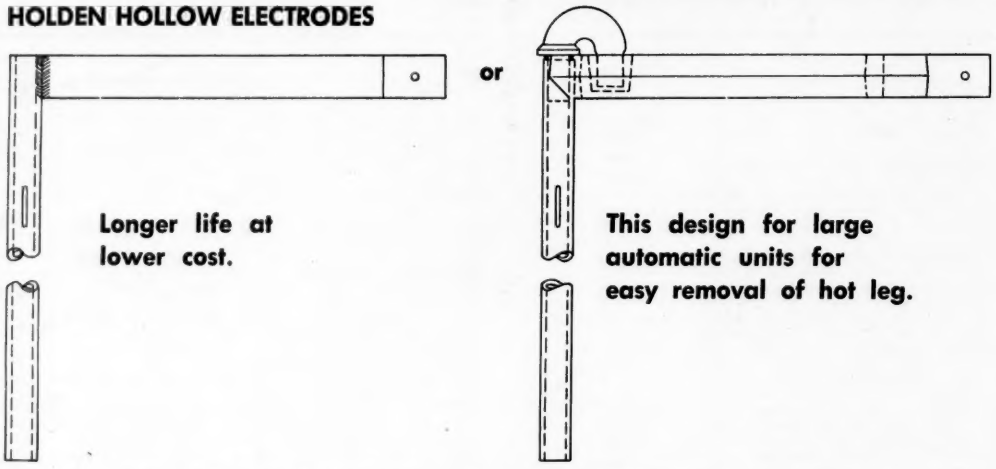


Longer life at lower cost.

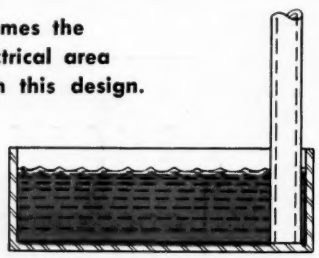
or

This design for large automatic units for easy removal of hot leg.

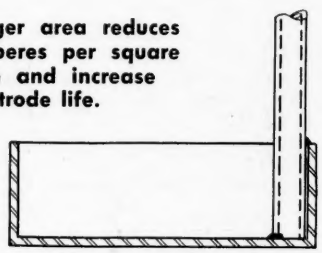
Improved circulation with less wear because salt flow cools center of electrodes. Electrode life—3 months to 5 years, depending on temperature.

---

4 times the electrical area with this design.

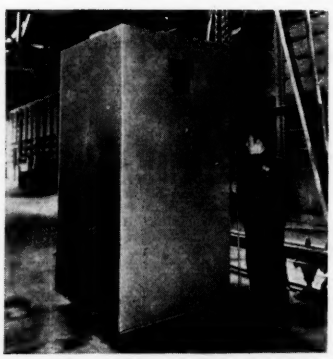


Larger area reduces amperes per square inch and increase electrode life.



The HOLDEN Liquid Furnace design can be operated either with liquid metal contact or the power conductor bar welded to the metal pool.

HOLDEN Liquid Electrode Furnace built by Holden licensee in Milan, Italy.



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